AUTO-TECH MASTERCLASS

Training for Master Technicians

Diagnostic Triage

- Battery and Ground
- Diagnostic Trouble Codes
- Do you have an engine?
- Case Study's

J2534 Programming Revisited

- Australian J2534 Portals
- When to do a software update
- Voltage stabilising
- Common errors and examples

2021.1

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LOOK FOR THESE SYMBOLS THROUGHOUT THE MANUAL

Note: *Indicates a point of interest*

Caution: *Indicates the risk of minor injury, special procedure or possible damage to a component*

WARNING: *Indicates the risk of serious or life threatening injury*

Section i

Diagnostic Triage

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INTRODUCTION

Where to start? This is the question that every technician will ask themselves at the beginning of every job. In fact; it is so second nature that most people are not aware that they do it.

Automobile triage
Triage is a medical term for an initial set of tests carried out to assess the order of treatment or how the diagnosis should be approached. Adapting this medical approach for the automotive industry could be the answer to reduced diagnostic time and a reduction in non-billable labour time.

By narrowing down the possible causes it should be easier to give the customer a more accurate estimate on the time required to diagnose and repair the vehicle.

INFORMATION FROM THE CUSTOMER

A key starting point for all diagnostics is accurate information about the issue from the customer. A diagnostic questionnaire sheet will help to prompt the right questions and provides a logical place to document the responses. The full-size version of the Diagnostic Questionnaire is provided at the end of this chapter so that it can be removed to be copied if necessary.

AUTO TECH

Diagnostic Questionnaire

Customer _____

Vehicle _____ Rego _____

☐ MIL ON ☐ Warning light _____ ☐ Warning message_____

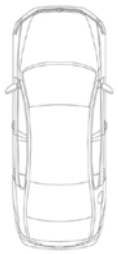
Engine

☐ Hard to start	☐ Starts and stalls	☐ Rough Idle	☐ Idle speed high
☐ Idle speed low	☐ Stalls	☐ Hesitation	☐ Surge
Excessive exhaust smoke	Loss of power	Stalls	☐ Engine knock
☐ Black	☐ under load	☐ at idle	☐ Running on
☐ Grey-Blue	☐ at high speed	☐ while driving	☐ Backfire
☐ White	☐ continuously	restarts easily YES / NO	☐ Poor fuel economy

Transmission

Engagement felt	☐ Harsh upshift	Shift lever position	
☐ Reverse	☐ Harsh downshift	☐ Park	☐ Drive
☐ Drive	☐ Hesitation	☐ Reverse	☐ Other_____
☐ No drive (slippage)	☐ Vibration	☐ Neutral	

Driveline

Noises		Vibrations	Location
☐ Squeak	☐ Click	☐ Steering Wheel	
☐ Squeal	☐ Growl	☐ Brake Pedal	
☐ Hum	☐ Clunk	☐ Gear lever	
☐ Hiss	☐ Whir	☐ Seat	
☐ Grinding	☐ Whine	☐ Body	
☐ Knock	☐ Other _____	☐ Other _____	
☐ Rattle			

Occurance

Frequency	Engine Temperature	Fuel Tank Level	Weather
☐ Intermittent	☐ Cold start	☐ Low	☐ Cold
☐ Continuous	☐ Warming up	☐ Mid ____%	☐ Hot
☐ Started ____kms ago	☐ Normal	☐ Full	☐ Rain/Wet
☐ Since last repair	☐ Hot (above normal)	☐ Any	details _____
☐ Braking	☐ Decelerating	☐ Cruising	☐ Accelerating
☐ Traffic (stop and go)	☐ Cornering	☐ Accessory ON _____	☐ Towing
☐ Smooth roads	☐ Rough roads	☐ Dirt roads	☐ Off-road
☐ Vehicle speed ____km/h	☐ Engine speed _____rpm	☐ Specific gear _____	☐ Cruise Control ON / OFF

Other

Driving Habits	Fuel Type	Fuel Brand _____
☐ City traffic (stop/start)	☐ 91 ☐ 95 ☐ 98	Has someone else attempted to repair this issue? YES / NO
☐ Highway	☐ E10 ☐ E85	Details:
☐ Avg. trip_____kms	☐ Diesel ☐ LPG	_____
Notes:		

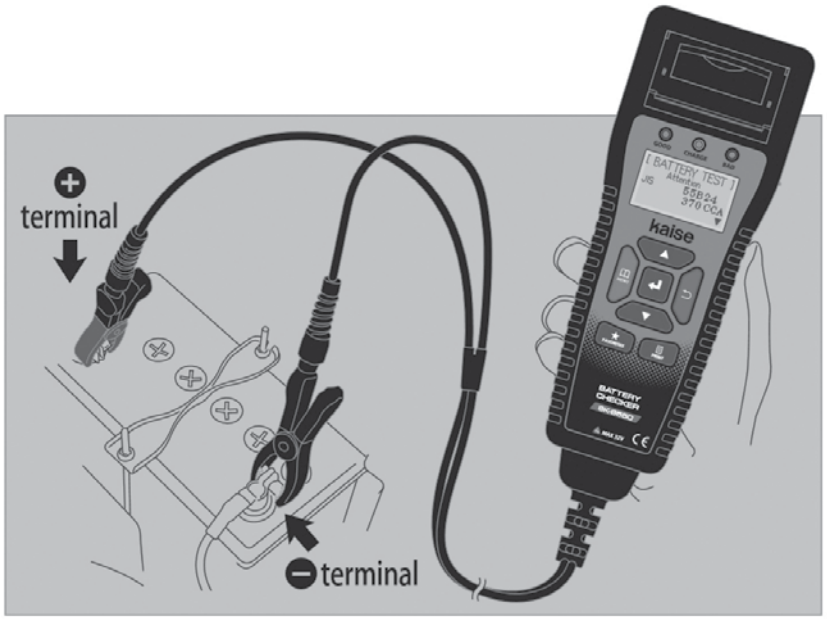
BATTERY

Battery voltage

Regardless of what fault a vehicle may have, the first place to start is the battery. Diagnostic Trouble Codes (DTCs) can not be trusted if the vehicles battery is not maintaining minimum voltages. Diagnostics should never start unless the battery has been checked to ensure that it is not in a weak or discharged condition. Furthermore, extended diagnosis of the vehicle can drain even a good battery.

Testing the battery

While a basic battery test can be carried out with a multimeter a conductance battery tester will provide a more accurate result. Conductance testers often include the ability to test the alternator and starter systems which is also beneficial.



Battery Test Report

Date and Time
2020/03/15 15:00
(Aging Test Mode)

Test Result : Good

Battery Type ——— JIS
Model No. ——— Q-85
Measured CCA ——— 615CCA
Battery Voltage ——— 12.780V
Temperature ——— 24℃
Testing Mode ———
Charge controller / Idle Reduction

SOC (State of Charge) : 100%

SOH (State of Health) : 100%

System Test Report

Store Name

Person in Charge

Date and Time
2020/03/15 15:05
(12V System)

START PERFORMANCE TEST

Test Result : Good

Cranking ——— 8.619V
Start Performance ——— 100%

CHARGING SYSTEM TEST

Test Result : Good

Charging Voltage ——— 14.523V
Ripple Voltage ——— 0.110V

BATTERY continued...

Multimeter indicating a good static voltage

Battery State of Charge (SoC)

State of Charge	Voltage	Specific Gravity @ 26.7°C
100%	12.6V	1.270
75%	12.4V	1.230
50%	12.2V	1.190
25%	12.0V	1.145
0%	11.9V	1.100

Minimum Voltages

The minimum voltages vary between vehicles and the more ECUs a vehicle has the more critical it becomes. There are different minimum voltages for different conditions:

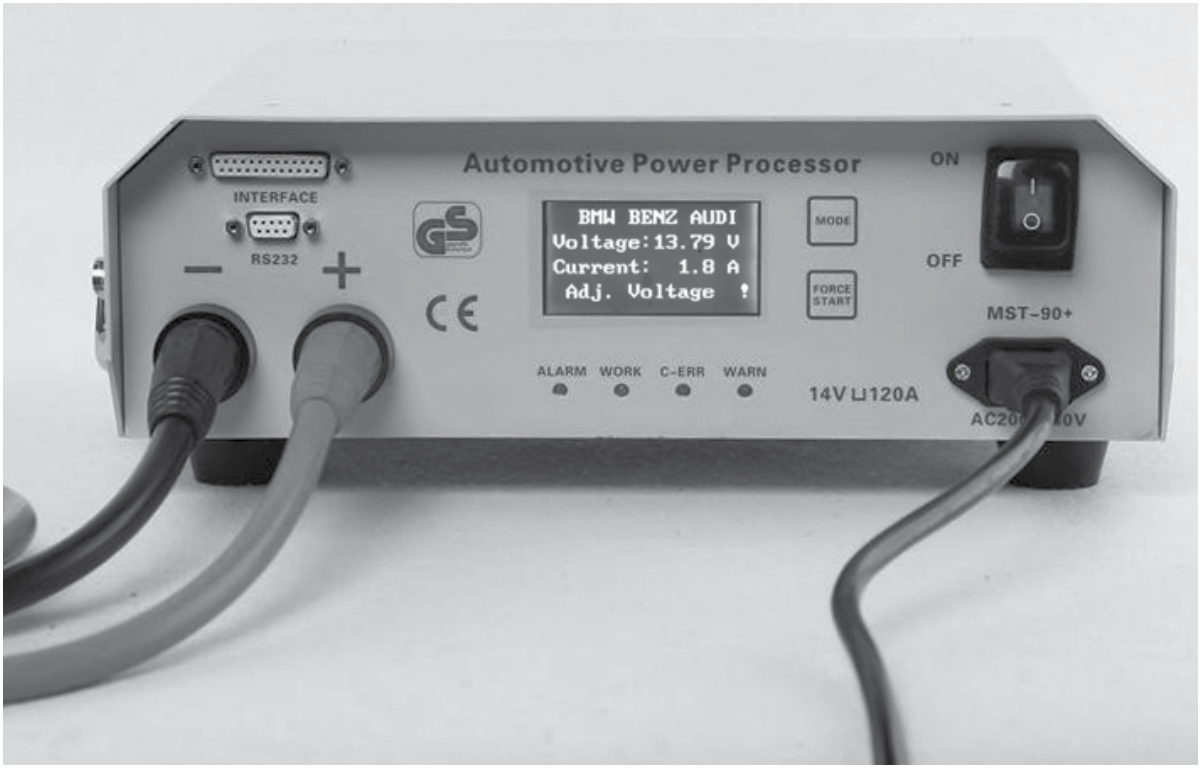
- Static voltage (all ECUs in hibernation): 12.6 Volts
- Key on Engine Off (KOEO): 12.0 Volts
- Engine cranking: Peak voltage drop to a minimum of no less than 7.0 Volts
- Average voltage while cranking shouldn't drop below 10.5 Volts

Caution: *It is possible to have a fully serviceable battery that is simply too small for its application resulting in a good static battery test. Load testing will identify if this may be the cause!*

BATTERY continued...

Voltage Stabilising

A growing number of technicians are using a voltage stabiliser during diagnostics. Often purchased for vehicle programming the voltage stabiliser is a very useful assistant during diagnosis.



By setting the voltage to a typical running voltage (eg. 13.8V) while carrying out diagnosis it is possible to test the vehicle with a voltage closer to running condition without risk of the voltage dropping over time.

A recent diagnostic case on a 2013 Hyundai iMax, after over 2 hours of testing the voltage stabiliser kept the battery voltage on the desired voltage the entire time.

DIAGNOSTIC TROUBLE CODES (DTCs)

While Diagnostic Trouble Codes (DTCs) are an important part of diagnosis they are far too often given far too much credibility and expected to display the cause of the fault on the screen. There appears to be a trend in some workshops where if a vehicle presents with a single DTC then the fault is straight forward, the Scan Tool has done its job and the part listed in the DTC description is ordered. This is pot luck diagnosis.

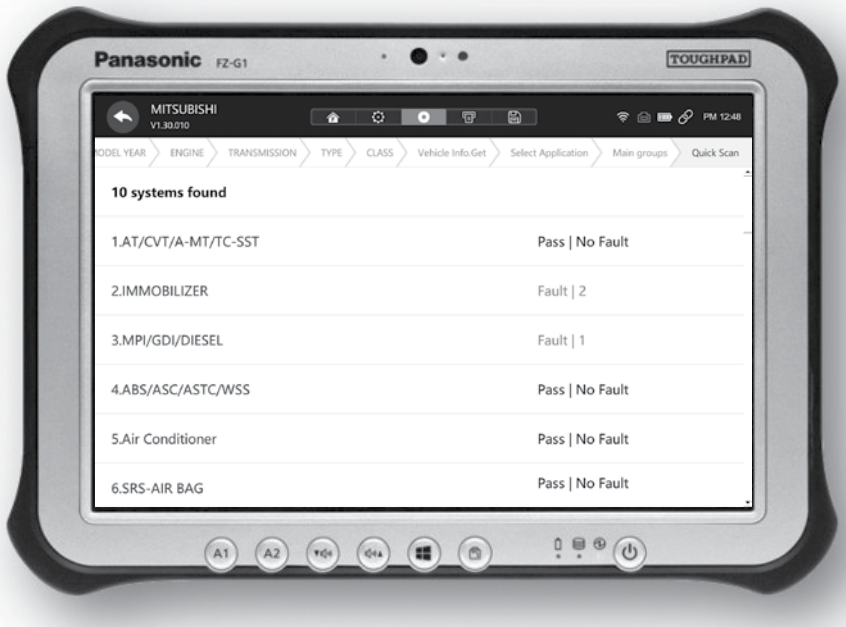
A DTC is logged when a sensor, a sensor circuit or operational parameter operates outside of its preset range. Whether it is one DTC that is logged, three DTCs or even twenty seven DTCs it does not log the individual codes with any more accuracy. DTCs are a little tip from the ECU that is simply telling the Scan Tool "Hey, I saw a problem over here". From there it is up to the technician.

The DTC process
There are three steps that should be worked through with DTCs before the actual sensor, its circuit and the component can be tested:

- Read DTCs
- Record DTCs
- Analyse DTCs

Reading DTCs
This is the easiest part, use a compatible Scan Tool that has manufacturer coverage for the particular vehicle and follow the on screen process.

Note: *When possible choose the full vehicle scan option, it will provide a greater understanding of the vehicles issue or issues.*



DTCs continued...

Recording DTCs

It is necessary to store DTCs for a variety of reasons:

- Evidence of the vehicle condition when it arrived at the workshop
- List of DTCs to verify against after diagnosis and repairs have been carried out
- Assist in verifying to the customer the condition of the vehicle before and after repairs
- A useful resource for future diagnosis either on the same vehicle or when diagnosing a similar comparable vehicle.

Recording diagnostic data can be stored:

Diagnostic files stored on Scan Tool

Diagnostic files stored on PC

Diagnostic files stored online using workshop management software

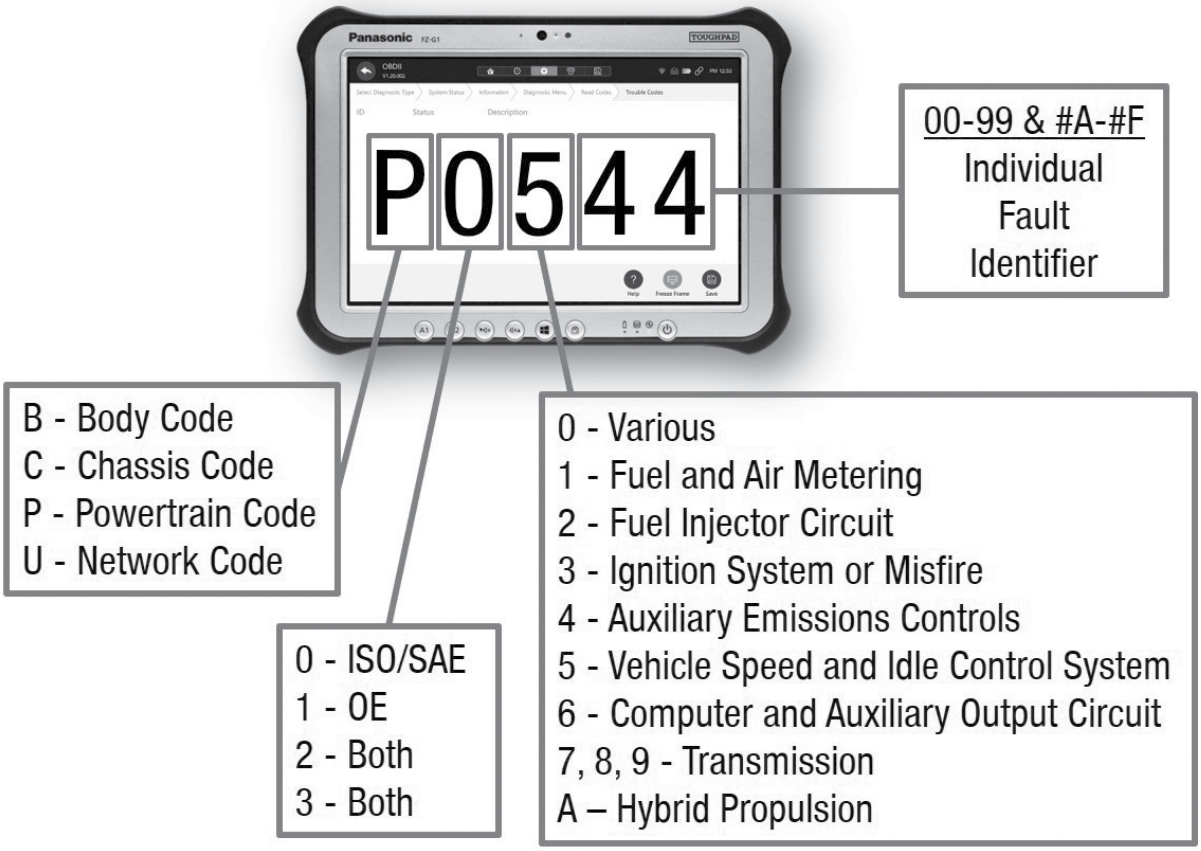
Stored as hardcopy's

Note: *When saving data it is helpful to tag the file name with all of the key information to assist in future searches:*
Make, Model, Year, VIN, Rego, Name, Date.
Create your preferred format and stick to it!

DTC ANALYSIS

The DTC

When analysing a DTC it starts with extracting the information from the DTC code itself.

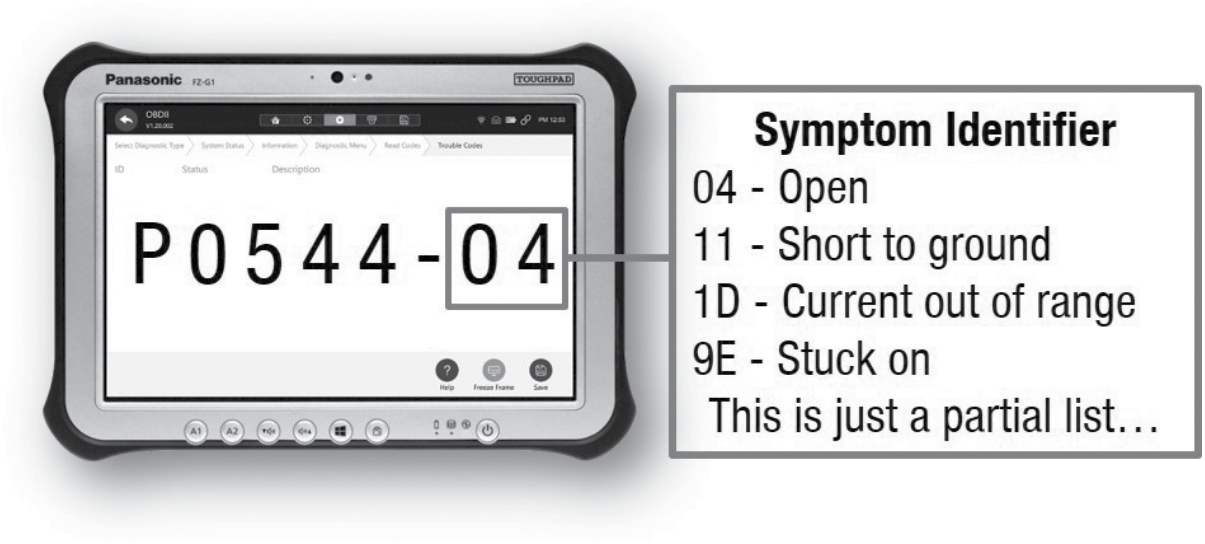


DTCs ANALYSIS continued...

7 digit DTCs

In 2013 the SAE (Society of Automotive Engineers) in the US developed new 'enhanced' DTC standards (J2012) that incorporated the introduction of 7 digit DTCs. In 2015 the International Standards Organisation released its latest standard for DTCs (ISO 15031-6:2015) which incorporated J2012.

The extra 2 digits are 'Symptom Identifiers' and provide additional information to the original 5 digit DTC. These extra two digits can help to direct the technician as to how the diagnosis should proceed.



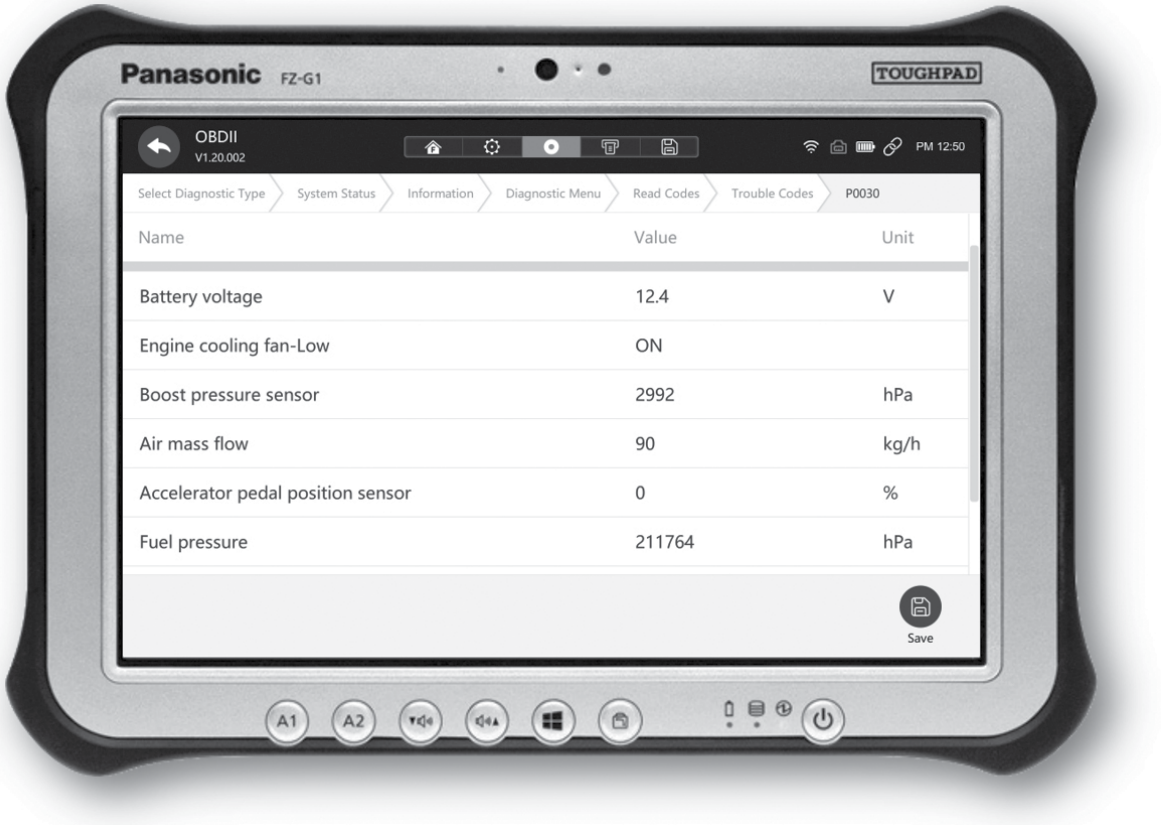
Here are the identifier codes that we have been able to collate:

00 = Not specified
04 = Open
11 = Short to ground
12 = Short to B+
13 = Open
14 = Short to ground or open
15 = Short to B+
16 = Circuit voltage below threshold
17 = Circuit voltage above threshold
18 = Current below threshold
1A = Circuit resistance below threshold
1C = Voltage out of range
1D = Current out of range
23 = Signal stuck low
24 = Signal stuck high
27 = Rate of change above threshold
29 = Performance signal invalid
2A = Stuck in range
2B = Signal cross coupled
2F = Signal erratic
31 = No signal
44 = Data memory failure
47 = Controller failure
49 = Internal electronic failure
51 = Not programmed
62 = Signal comparison failure
64 = Plausibility failure
71 = Actuator blocked
72 = Actuator stuck closed
74 = Actuator slipping
77 = Command position not achievable
7E = Actuator stuck on
7F = Actuator stuck off
85 = Signal above allowable range
87 = Missing communication message
93 = Performance no operation
96 = Component internal failure
9C = Low insufficient flow
9E = Stuck on

DTC ANALYSIS continued...

Freeze Frame Data

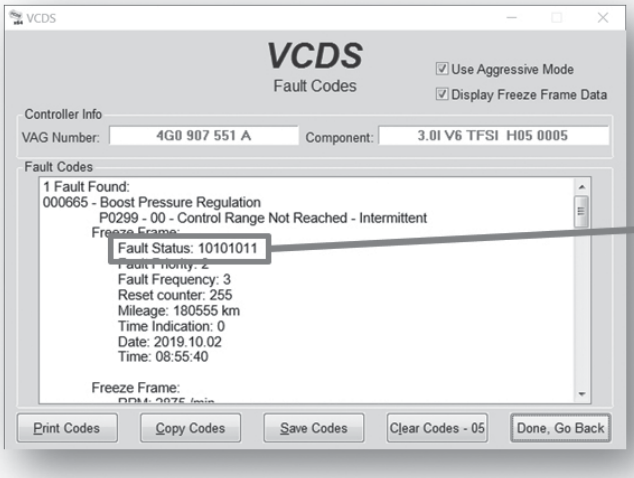
The freeze frame data that a Scan Tool has availability to is limited to what has been negotiated between the Scan Tool Manufacturer and the Original Equipment Manufacturer (OEM). These negotiations are often facilitated by not-for-profit organisations such as the Equipment and Tools Institute in the United States. Unfortunately for Australian workshops this means that unless purchasing a manufacturer specific Scan Tool the amount of Freeze Frame Data accessed by generic Scan Tools is limited. For emission related codes, using the generic OBDII scan facility will provide the Freeze Frame Data for these codes.



The Fault Specific Freeze Frame Data provides data specifically relevant to the DTC.

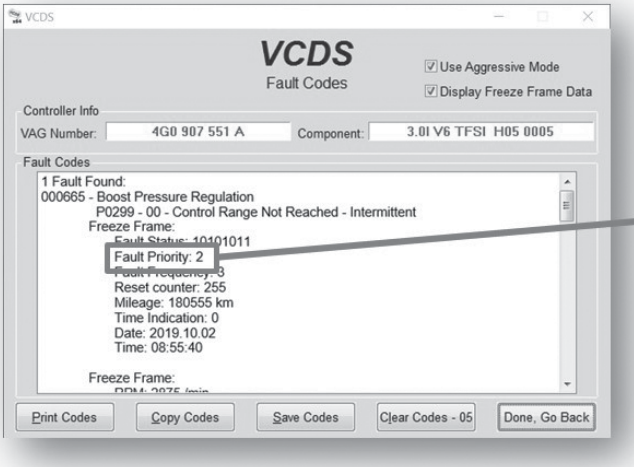
DTCs ANALYSIS continued...

With manufacturer level Freeze Frame Data there can be a variety of parameters that can assist in diagnosis. The following example is using Ross-Tech's VCDS on a Volkswagen Group (VAG) vehicle:



Fault Status:
10000000 – MIL ON
01000000 – Test completed
00100000 – Test failed prev.
00010000 – Test not comp.
00001000 – Confirmed DTC
00000100 – Pending DTC
00000010 – Test failed now
00000001 – Active fault

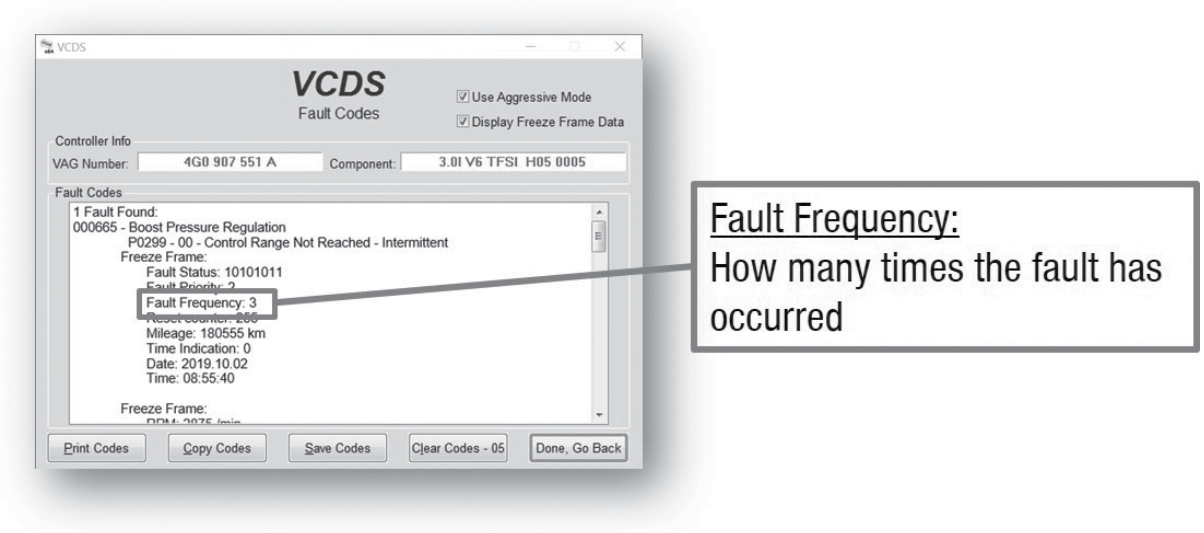
The Fault Status gives helpful stats, such as:
If this DTC is responsible for the illumination of the Malfunction Indicator Lamp (MIL)



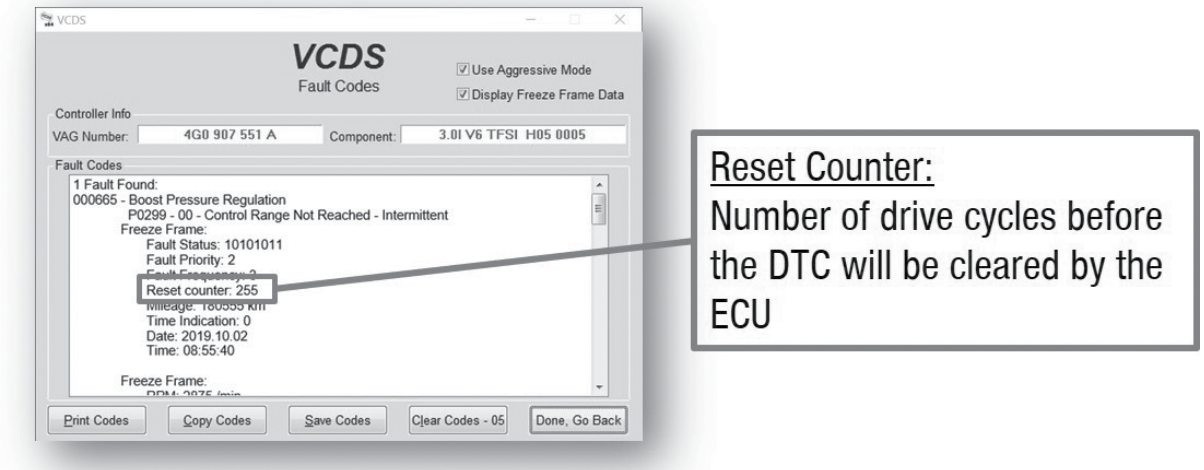
Fault Priority:
0 - Undefined
1 – Strong affect (don't drive)
2 – Req. immediate attention
3 – Non urgent
4 – Repair recommended
5 – No influence on drivability
6 – Long term infl. on drive
7 – Infl. on comfort feat. only
8 – General note

The Fault Priority can help to guide the technician as to which DTC to address first. 1 being of the highest priority.

DTC ANALYSIS continued...

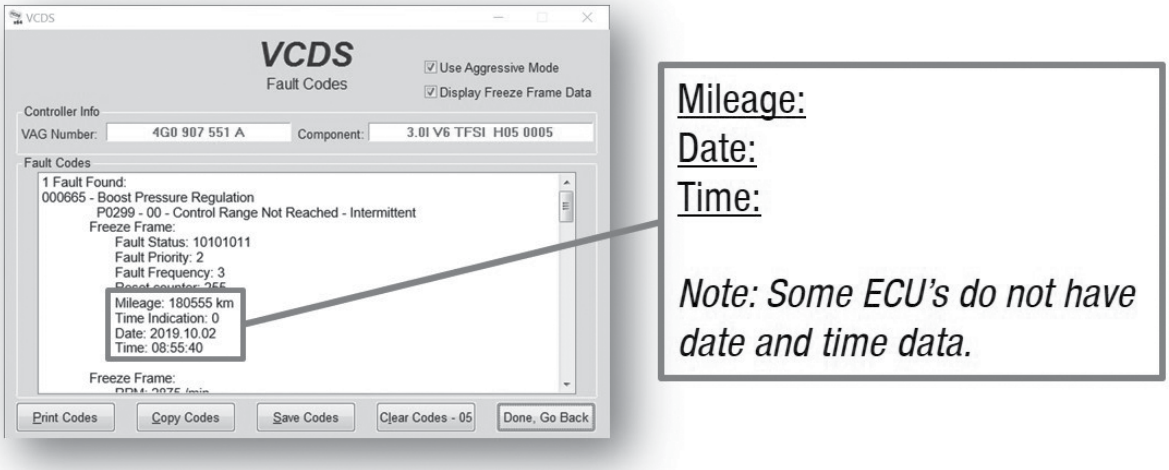


The Fault Frequency is a useful parameter when chasing intermittent faults. Along with the information from the customer and the Fault Specific information it can help to plan out how to reproduce the fault.

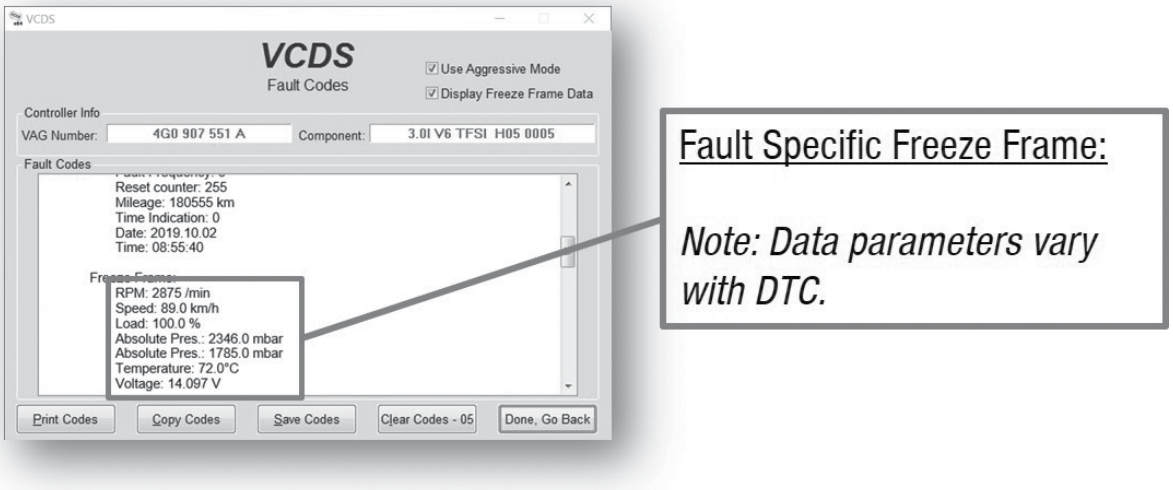


The Reset Counter lets the technician know how many drive cycles ago the fault occurred. 255 is the highest value and therefore the DTC in this example was set during the last drive cycle.

DTCs ANALYSIS continued...



These parameters are self explanatory. However, not all ECU record the date and time.

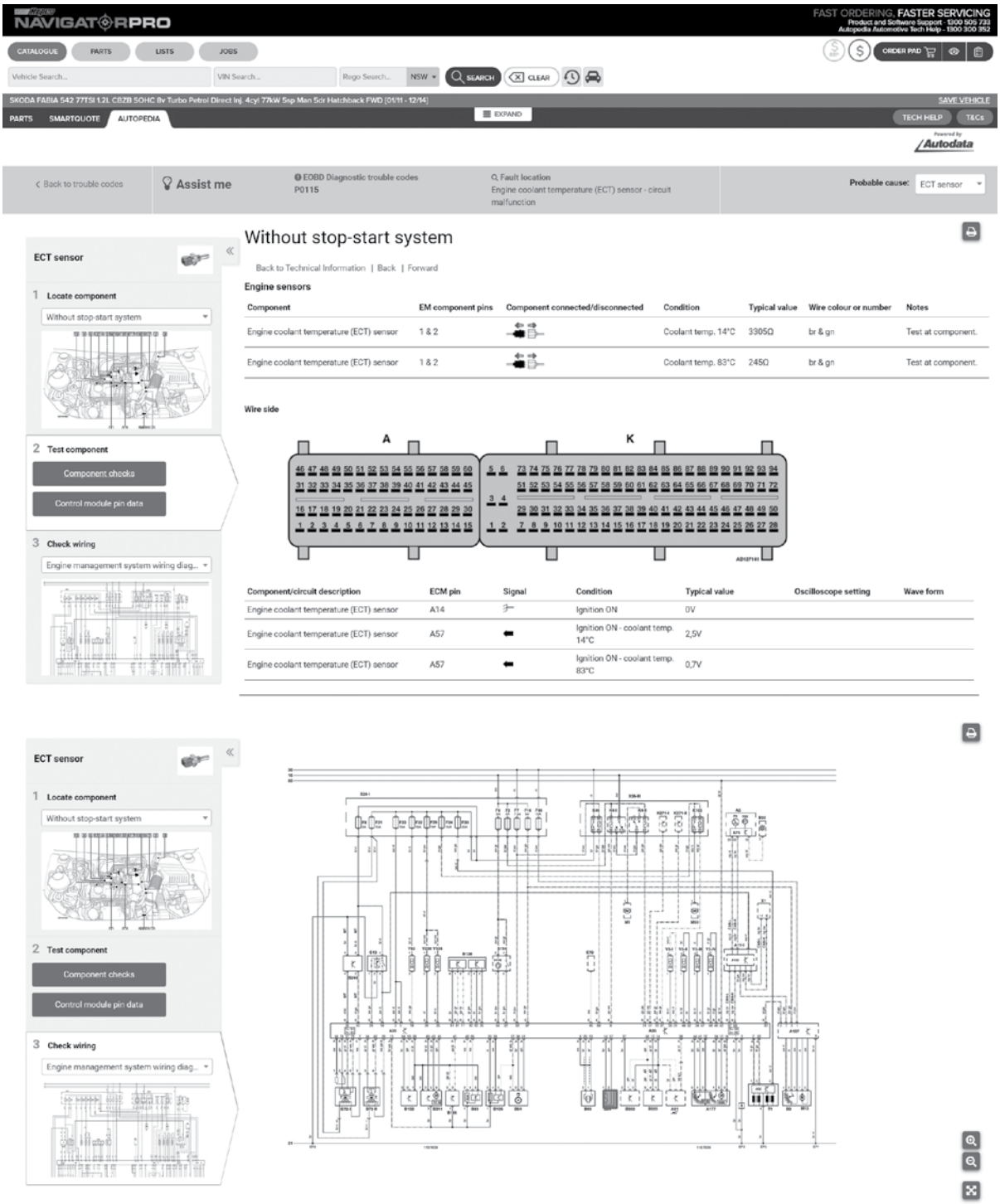


The Fault Specific Freeze Frame Data provides data specifically relevant to the DTC.

DTC ANALYSIS continued...

Access supporting information

After the Triage process is complete the following information will be needed. Sourcing that information now will help to reduce diagnostic time. If the information needed is not readily available you may need to subscribe to an OE information source and the cost of this will need to be included in your estimate.



Data sources such as Autopedia provide easily accessible content that has been condensed down to the immediately necessary information.

DTCs ANALYSIS continued...

The most important information that is required for effective diagnosis is:

- Wiring diagrams
- ECU and connector pin data
- Circuit testing data
- Component testing data

If OE data is required more time will be needed to locate the necessary information. Taking the time to scroll through the wealth of information provided can produce some diagnostic gold like this DTC Inspection Priority Chart provided by Nissan. Nissan provide these charts with most engine ECU data and they are specific to each engine in each vehicle model.

< ECU DIAGNOSIS INFORMATION > **[M9R]**

DTC Inspection Priority Chart

INFOID:0000000007974353

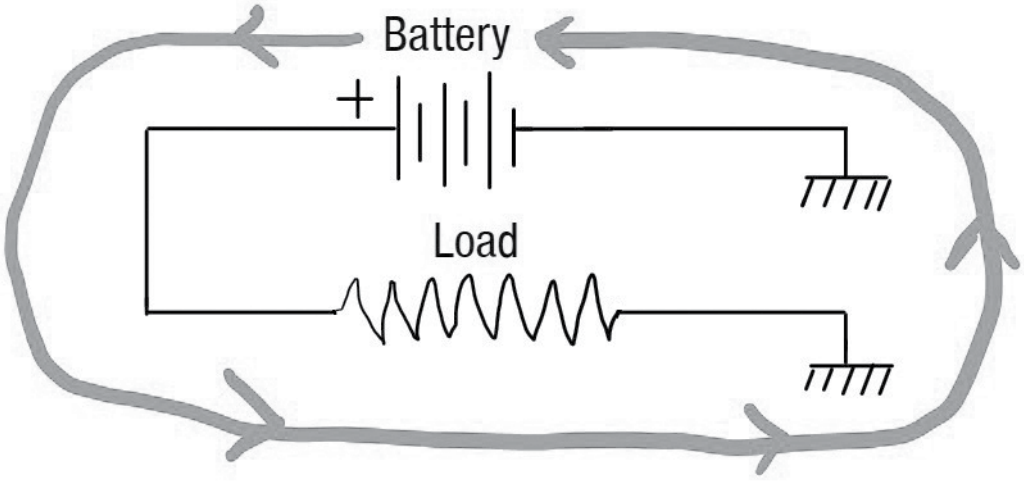
If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	Detected items (DTC)
1	• U1000 CAN communication line • P0016 Crankshaft position - camshaft position correlation • P0100 P0101 Mass air flow sensor • P0110 Intake air temperature sensor • P0115 Engine coolant temperature sensor • P0120 Throttle position sensor • P0130 P0131 P0133 P0134 P2231 P2A00 Air fuel ratio (A/F) sensor 1 • P0135 Air fuel ratio (A/F) sensor 1 heater • P0180 Fuel temperature sensor • P0190 P2293 Fuel rail pressure sensor • P0225 P2120 Accelerator pedal position sensor • P0235 Turbocharger boost sensor • P0335 Crankshaft position sensor • P0340 Camshaft position sensor • P0409 EGR volume control valve control position sensor • P0470 Exhaust gas pressure sensor • P0500 Vehicle speed sensor • P0525 ASCD system • P0530 Refrigerant pressure sensor • P0544 P2080 Exhaust gas temperature sensor 1 • P0560 Battery voltage • P0606 P060B P062B P062F P1607 ECM • P0611 Injector adjustment value • P0641 P0651 P0697 Sensor power supply • P1610 - P1616 NATS • P2031 Exhaust gas temperature sensor 2 • P2226 Barometric sensor • P2299 Accelerator pedal - brake pedal position sensor inconsistency • P2452 Differential exhaust gas pressure sensor • P2453 Differential exhaust gas pressure sensor
2	• P0045 Turbocharger boost control solenoid valve • P0089 P2294 Fuel rail pressure control valve • P0090 Fuel pump • P0200 P0201 - P0204 P0263 P0266 P0269 P0272 P1201 - P1204 P2146 P2149 Fuel injector • P0380 Glow plug • P0487 P0488 EGR volume control valve • P0571 Brake pedal position sensor • P0670 Glow control unit • P0685 ECM relay • P2100 Electric throttle control actuator • P2101 Throttle position sensor • P2425 EGR cooler bypass valve control solenoid valve • P2505 Ignition relay • P2600 Turbocharger cooling pump
3	• P0297 P3031 Service regeneration • P0300 - P0304 Misfire • P0564 P0575 ASCD steering switch • P1435 P1436 DPF regeneration • P1525 ASCD system • P2002 P242F DPF • P2263 Turbocharger system

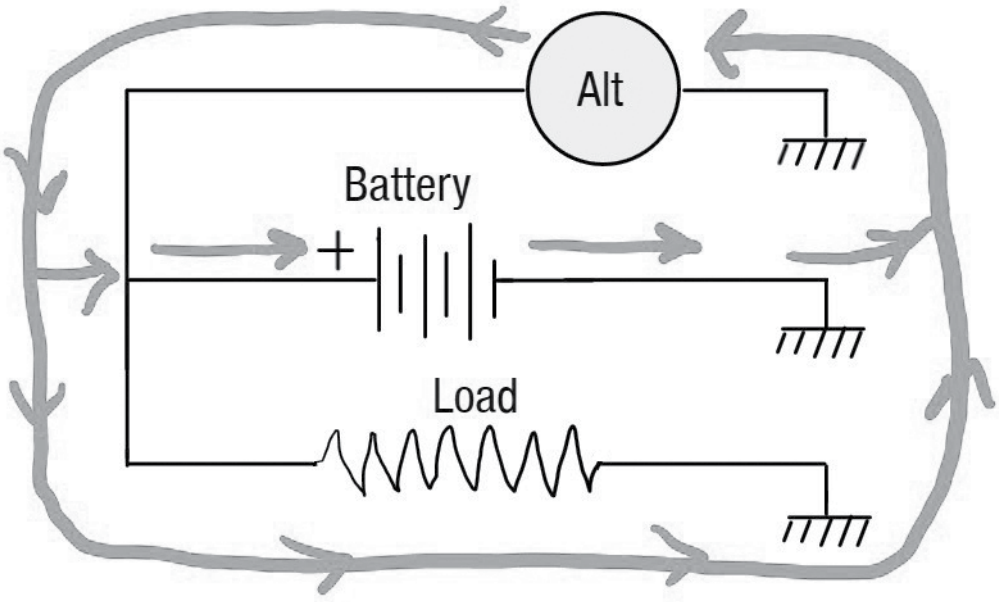
GROUNDS

Ground related issues remain one of the leading causes of electrical faults and they also continue to be the most overlooked cause of electrical faults. Accurate ground testing can only be achieved by performing a Voltage Drop test under electrical load.

Key On Engine Off (KOEO) testing
The negative battery terminal is the reference point because it is the absolute completion of the electrical circuit.

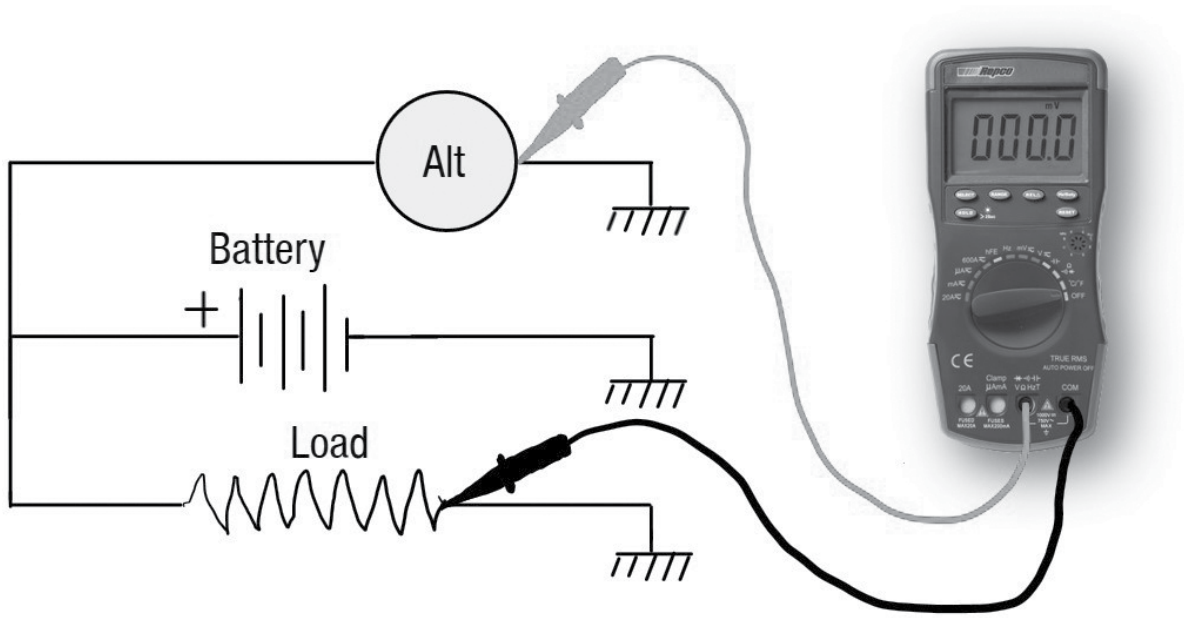


Key On Engine Running (KOER) testing
With the engine running the alternator case becomes the reference point as it is now the completion of the ground circuit. At this point the battery becomes an electrical load upon the circuit.



DTCs ANALYSIS continued...

Voltage Drop



A Continuity (Resistance /Ohms) test does not apply load to the circuit. A single strand of a broken wire can be enough for the multimeter to identify continuity. The Voltage Drop testing method is carried out under normal operating load conditions and works equally well on the positive side of electrical circuits. The acceptable voltage drop varies depending on the circuit.

Circuit	Voltage Drop
Sensor Connection	<50 mV
Ground Circuit	<100mV
Wiring Harness	<200mV
Switch Contacts	<300mV

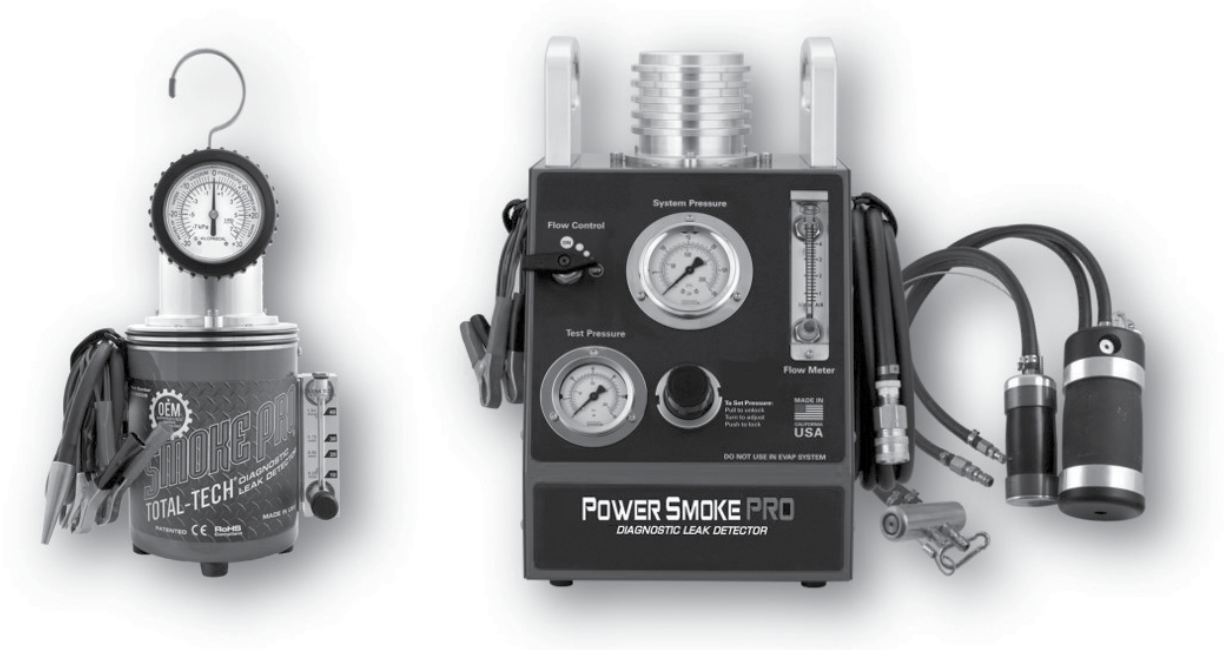
DO YOU HAVE AN ENGINE?

Do you have an engine?
What is meant by this statement? Well the detailed extension of that question is; Are all the mechanical components of the engine in a serviceable condition? There are a number of ways to approach this, but in Automobile Triage the approach needs to minimise the time required.

For triage purposes we just need to know:
- Is it okay?
- Is it NOT okay?

There are two pieces of equipment that are unmatched for their ability to identify perform overall system testing quickly:
- Smoke Generators
- Pressure Pulse or FirstLook Sensors

Smoke Generators
Smoke generators use a special blend of mineral oil to produce a dense cool smoke that is suitable for all automotive systems. They require filling infrequently and the oil is inexpensive.



Left: Smoke Pro with output pressure of 0.5 PSI (3 kPa)
Right: Power Smoke Pro with output pressure of 2-20 PSI (14-140 kPa)

DO YOU HAVE AN ENGINE? continued...

Most diagnostic smoke generators do more than just emit smoke, most include the following functions:

- Smoke generator - obvious
- Flow meter - indicates size of leak you are looking for
- Pressure gauge - leak down interrogation

These days there are two groups of smoke generators, low pressure and high pressure.

Low pressure smoke generators can be used for all testing but are predominantly designed for EVAP system diagnostics. As Australia has been slow to enforce Evaporative Emission Systems their demand for diagnosis has not been great to date. To be suitable for EVAP testing the output pressure must not exceed 0.5 PSI (3 kPa).

High pressure smoke generators were originally developed for the heavy vehicle industry but their benefits were soon realised for light vehicle diagnosis in systems that could handle higher pressures. In particular Forced Induction Engines. With a large portion of the new vehicle fleet having downsized engines with turbochargers these smoke generators are proving very helpful as they can produce output pressures closer to operating pressure!

The high pressure smoke generator requires special inflatable adaptors that have a tether to prevent injury should they blow out under pressure.

DO YOU HAVE AN ENGINE? continued...

Intake System

When testing any system it is important to test the whole system, try to avoid isolating a section of the system because it has been disconnected in order to introduce the smoke. Also keep in mind any built in opening where the smoke could be lost, the obvious opening in the Intake is the Air Filter. The best place to introduce smoke into the Intake System is at the first accessible join after Air Filter. If for some reason this is not possible the next best option is the brake booster vacuum hose/pipe.

Note: *Purge system to reduce waiting time!*

Remove a hose or other item at the furthest point from where the smoke is introduced. Wait for a steady stream of smoke to be emitted then refit.

Now you're ready to search for a leak!

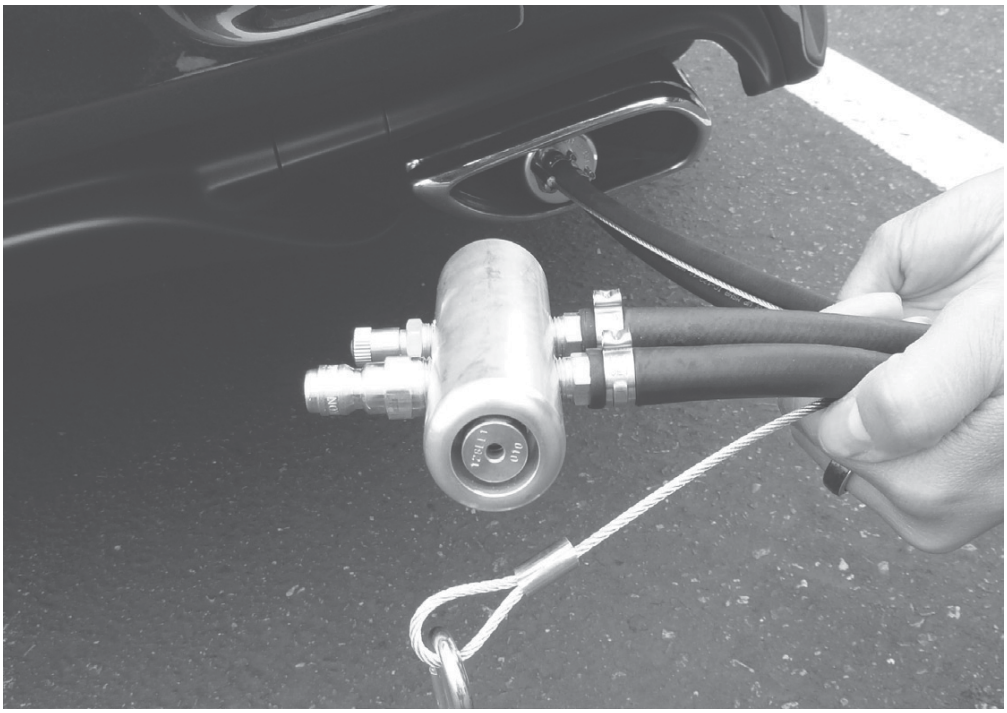
DO YOU HAVE AN ENGINE? continued...

Exhaust System

Caution: *Manufacturers of Diagnostic Smoke Machines state that the smoke generated is safe for all Exhaust Sensors as well as Catalysts, DPF's and SCR systems.*

This is ONLY if the approved fluid is used!

Most exhaust leaks can be found by simply introducing the smoke to the tail pipe via a sealed cone.



Exhaust adapter in tailpipe

Note: *For vehicles with multiple tailpipes, run smoke machine until smoke is emitted from the additional pipe/s (purge system) then plug or seal them off.*

Note: *It may be necessary block the intake in order to achieve enough back pressure to find smaller leaks.*

EGR test

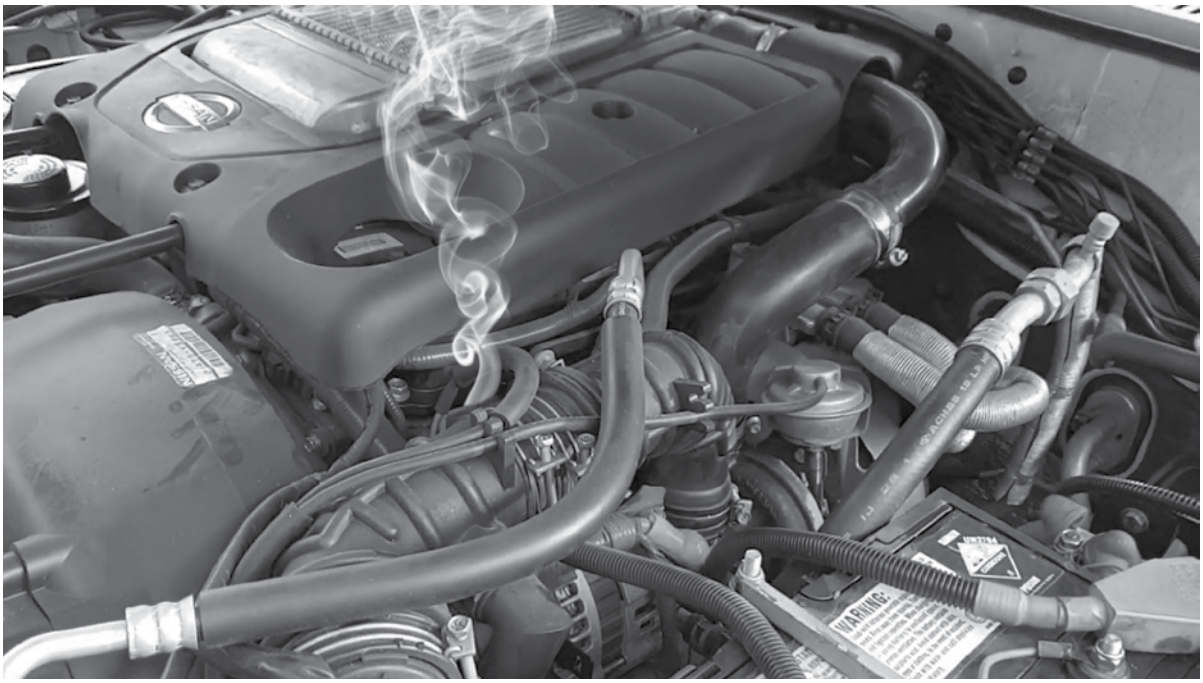
Disconnect the EGR Valve outlet pipe (the one between the EGR Valve and the Intake Manifold), check that smoke is NOT emitted. Apply vacuum to the servo (vacuum type valve) or command the valve open with a compatible Scan Tool (electric type valve) and check that smoke now escapes.

DO YOU HAVE AN ENGINE? continued...

DPF Pressure Differential Sensor test

To test for leaks in the DPF Pressure Differential Sensors and their associated hose follow the exhaust procedure but be sure to purge air from the pressure sensor hoses by disconnecting them briefly from the sensor.

Diagnostic example



This Nissan Patrol ZD30 had a squealing noise that sounded like a failing turbocharger. The low pressure smoke generator didn't identify the leak but the high pressure smoke generator set at 5 PSI (35 kPa) was able to identify the leak from the front of the exhaust manifold.

DO YOU HAVE AN ENGINE? continued...

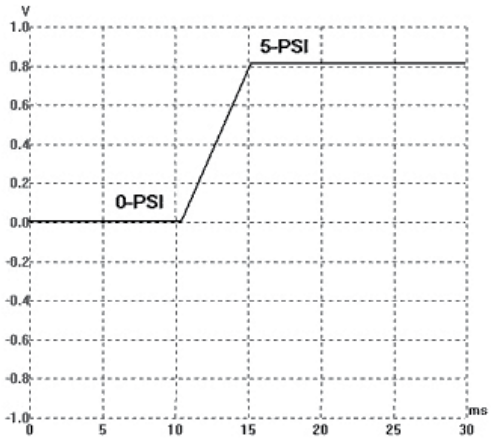
Pressure Pulse Sensors (FirstLook Sensor)

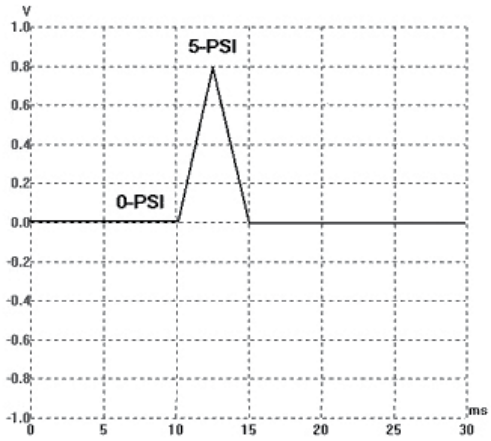
Pressure Pulse Sensors (commonly known by a brand name FirstLook) were originally developed to be used in conjunction with a misfire detection program that could be installed onto a PC and used in conjunction with a pc based oscilloscope. The misfire detection software had to be written specially for each vehicle model. It had a little success in the mid 2000's in the United States but was relatively unheard of in Australia. Since that time technicians have discovered that the sensors can be a very helpful diagnostic tool when coupled to an oscilloscope and viewed just as raw data.

Ditex - Pressure Pulse Sensor

SenX Technology - FirstLook Sensor

The pressure pulse sensor uses a piezo element, when a positive pressure is exerted upon it a small positive voltage is generated momentarily. When exposed to a negative pressure the current flow is reversed generating a momentary negative voltage. A pressure pulse sensor differs from a straight pressure sensor in that it only reacts to the change in pressure. If it is exposed to a continual pressure it will create a voltage pulse during the change in pressure and then output 0V until the pressure varies again.





Pressure Sensor *Pressure Pulse Sensor*

Both are connected to a constant 5 PSI pressure supply.

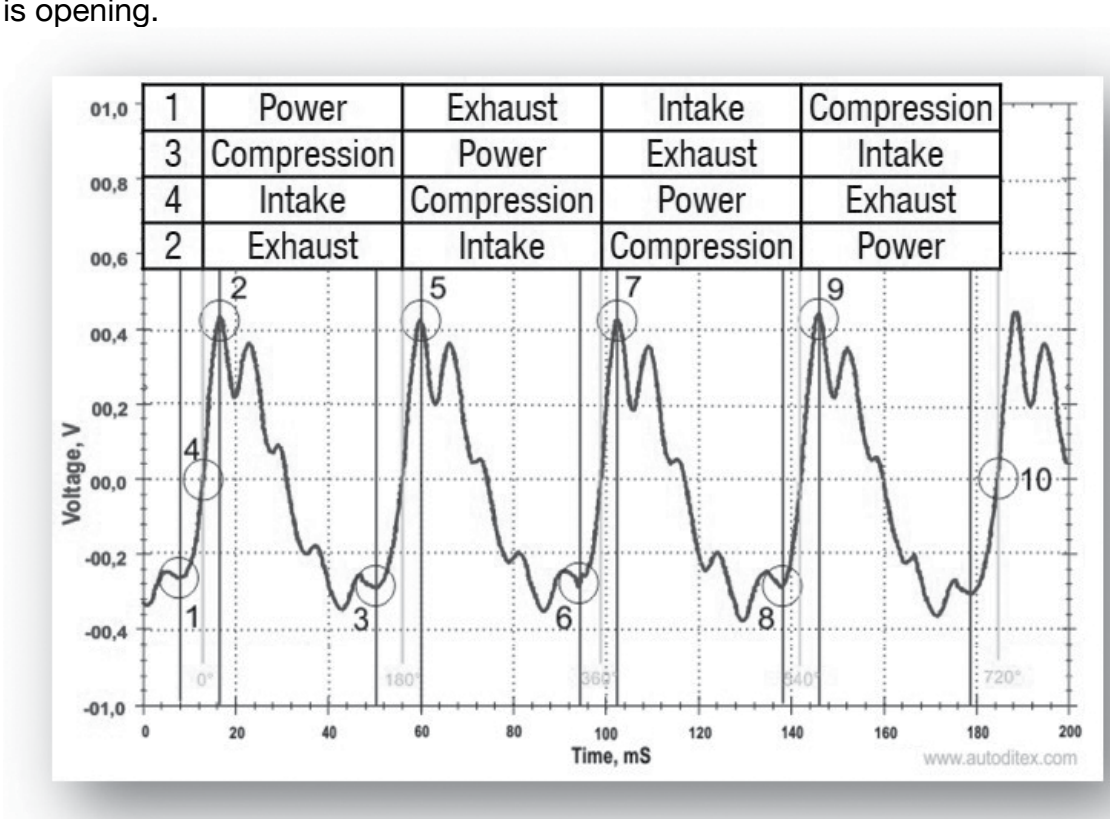
DO YOU HAVE AN ENGINE? continued...

The pressure pulse sensor can convert any pressure fluctuation into an electrical pulse within its operating range. This makes it a very useful diagnostic tool. It can be connected to:

- Intake Manifold
  - pressure pulses measured at a vacuum port
- Exhaust
  - pressure pulses measured at tailpipe
- Fuel Rail (older vehicles w/ vacuum actuated regulator)
  - pressure pulses measured at the FPR vacuum port
- Crankcase
  - pressure pulses measured at dipstick tube
- Cooling System
  - pressure pulses measured at radiator cap

Intake Manifold pressure pulses

With the sensor attached to a vacuum port on the intake manifold (on the plenum chamber if possible) the oscilloscope should output a waveform similar to the following. By overlaying a Combustion Cycle Table we can identify when each valve is opening.

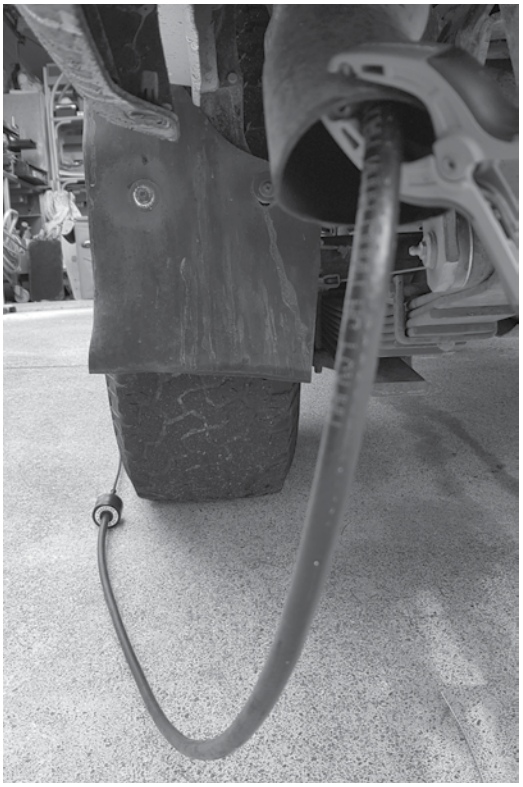


1. #4IV – opens
2. #4EV – closes
3. #2IV – opens
4. #1 - TDC
5. #2EV – closes
6. #1IV – opens
7. #1EV – closes
8. #3IV – opens
9. #3EV – closes
10. #1 - TDC

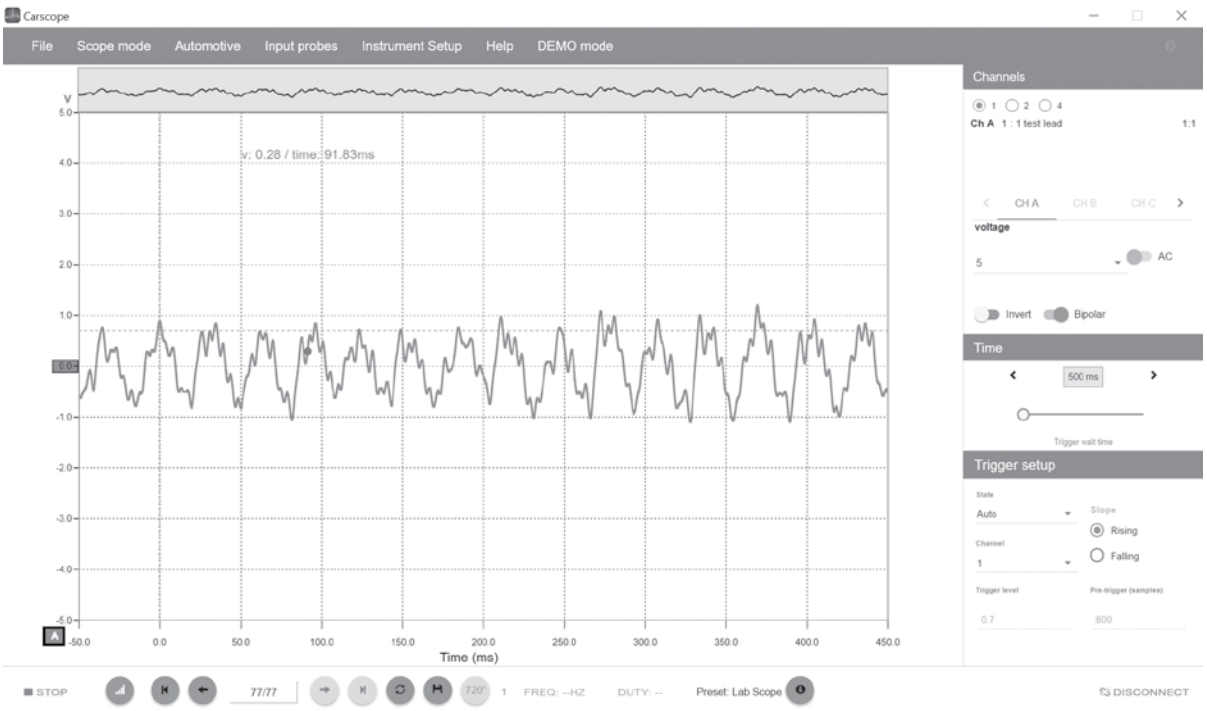
DO YOU HAVE AN ENGINE? continued...

Exhaust pressure pulses

The premise of using exhaust pressure pulses is theoretically sound but tends to be a little different from what is achievable in reality. The idea is that because the exhaust is the end of the line that anything that could cause any form of uneven engine operation will be present in the exhaust pressure pulses. While this is definitely true there are a few things to consider. The length of the exhaust system means that there is a considerable delay making matching a potential issue difficult to trace to a particular cylinder. Turbochargers, mufflers, catalytic convertor and DPF dampen out the pulses. Exhaust pressure pulses are more useful when observing an engine at cranking speed (rather than running, even at idle).



It has been the authors experience that the exhaust pulses are useful for checking the mechanical condition of an engine with a no start concern. Having said that there are other tests such as a cylinder balance test that are more appropriate for this.



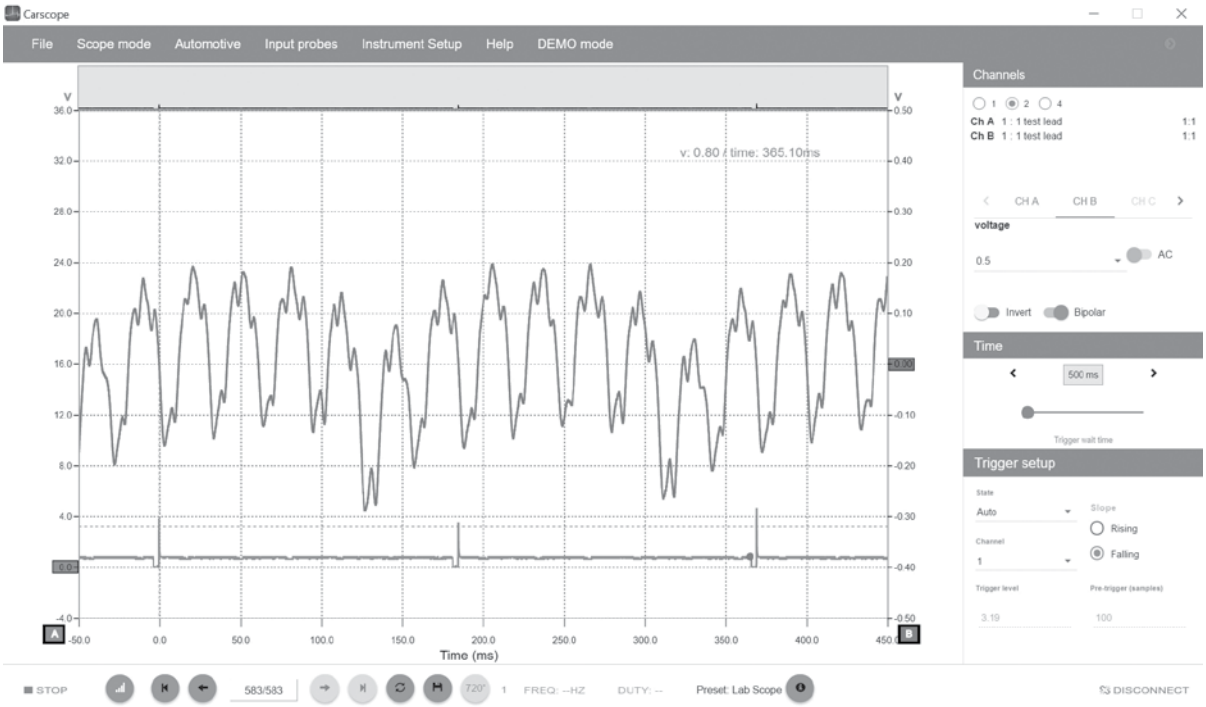
Exhaust pressure pulses - Engine cranking

CASE STUDY #1

2014 Ford FG-X XR6 Turbo

In this example the vehicle has an unstable idle.
Intermittently logging DTC P0171 (System too lean, bank 1)

First test:
Pressure pulse sensor to the intake manifold.

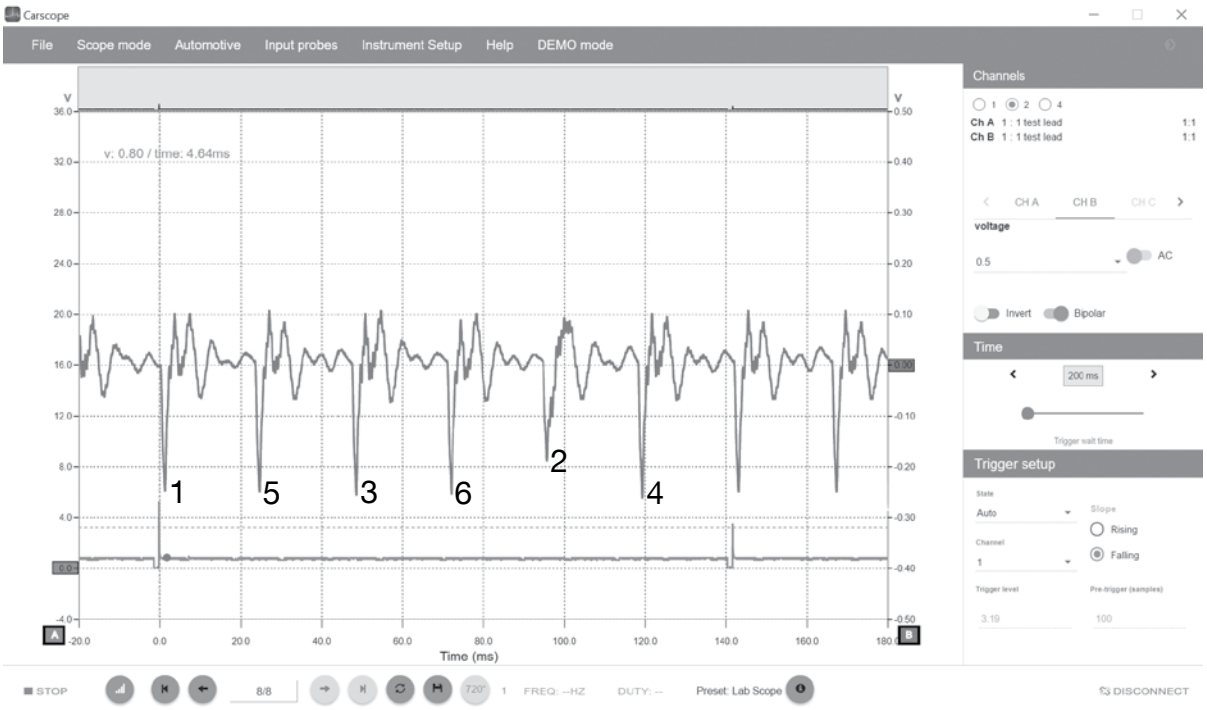


The unstable idle causes a fluctuation through the waveform but the valve events for each cylinder are still clearly visible.

CASE STUDY #1 continued...

Second test:
Pressure pulse sensor on fuel pressure regulator vacuum port.

By connecting to the fuel pressure regulators vacuum port the fluctuations in the fuel rail that are caused by the opening and closing of the injectors are converted into air movement by the diaphragm in the regulator valve. The pressure pulse sensor converts these pulses into a waveform.



Fuel rail pressure pulses with faulty #2 injectors

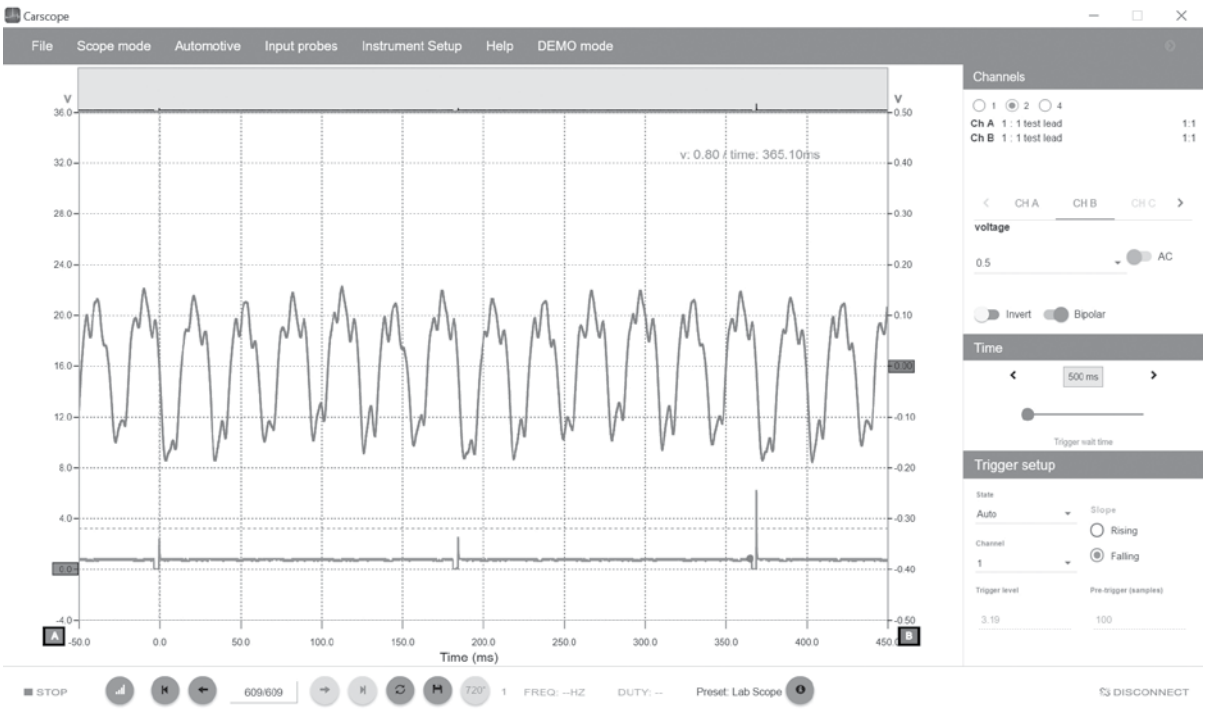
After adding the cylinder firing order identification based upon the #1 trigger (lower waveform) it is evident that the injection pulse for cylinder #2 is substantially lower than the other cylinders.

Repair:
Based on the above diagnosis a full set of Fuel Injectors were replaced.

Verification:
After the replacement the pressure pulse tests were repeated with the following results:

CASE STUDY #1 continued...

Fuel rail pressure pulses with new injectors



Steady idle after injector replacement

CASE STUDY #2

2015 Toyota Kluger GSU55R (2GR-FE engine)

The vehicle was presented for a scheduled service with a comment from the owner that the temperature was running a little higher than normal. The vehicle was inspected and the coolant level in the radiator was low even though the overflow reservoir still had coolant present.

First test:
Cooling system pressure test was performed with no obvious drop in pressure after 3 hours.

After checking the radiator cap and the vehicle for signs of leaks the suspicion moved to possibility of a blown head gasket.

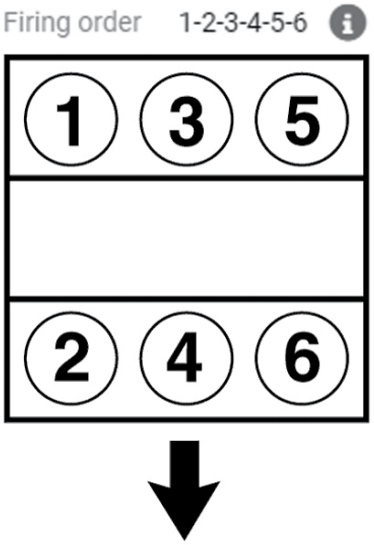
Second test:
A combustion leakage test was carried out and was inconclusive.

After topping up the cooling system and about 80km of road testing it was evident that there was a small amount of coolant loss but no evidence of a leak.

Third test:
A pressure pulse sensor was connected to the radiator overflow outlet pipe and a radiator blanking cap was fitted.

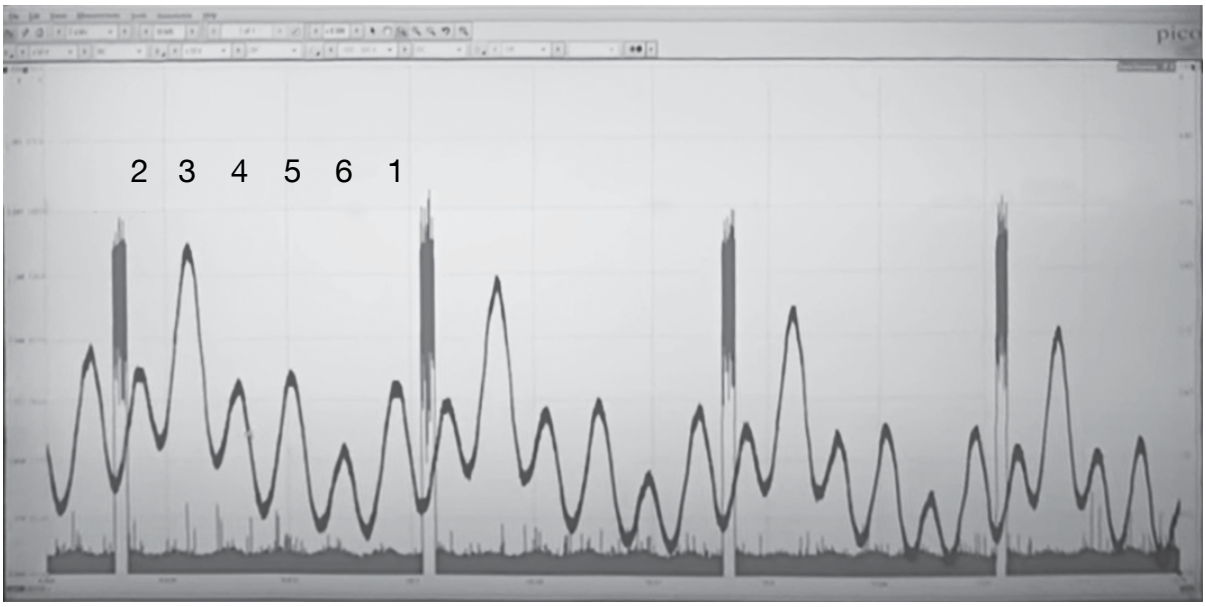
Caution: *The pressure pulse sensor is not resistant to liquid, a one metre long hose was used to connect the sensor that was hung from the open bonnet catch!*

CASE STUDY #2 continued...



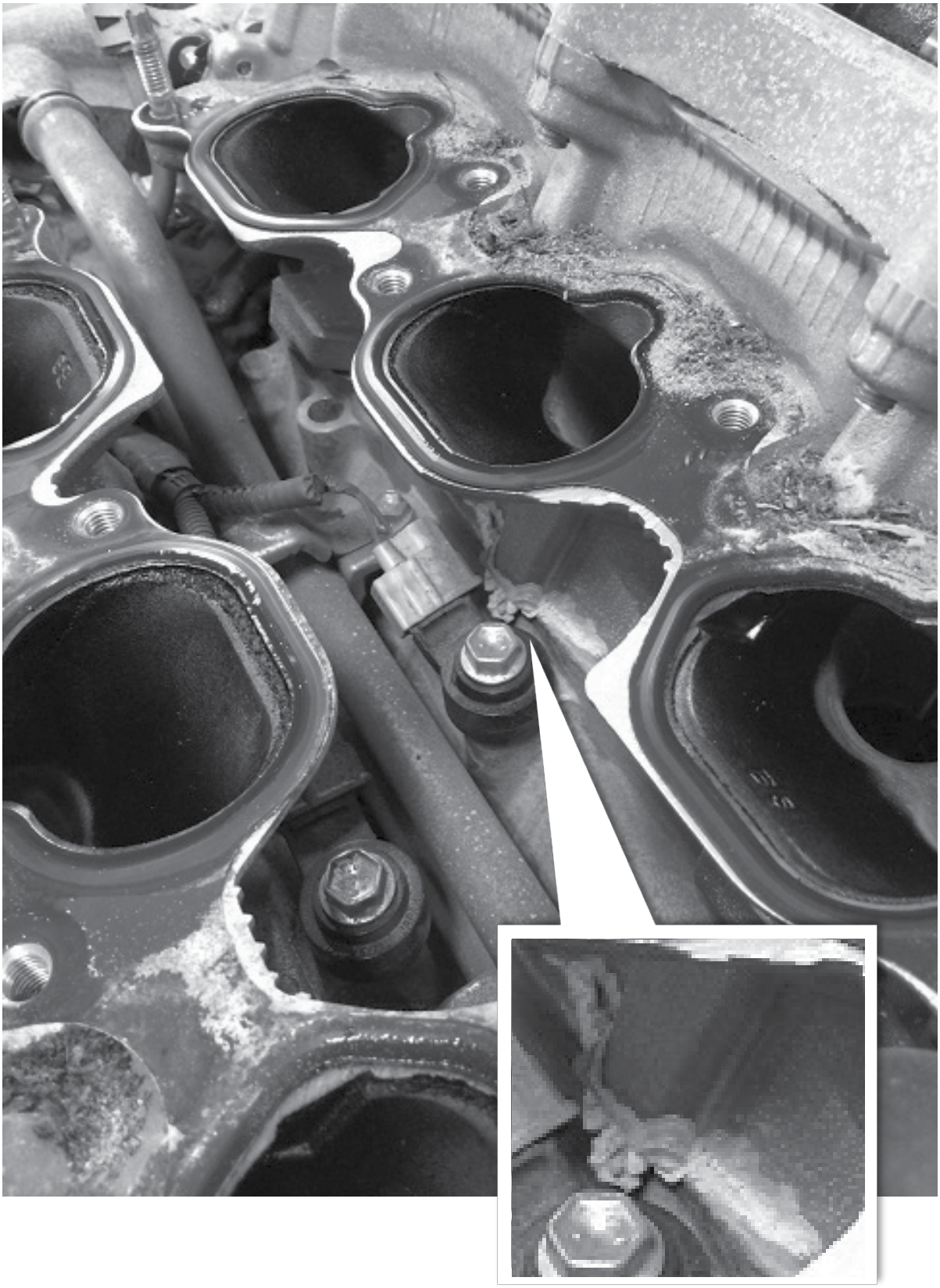
Radiator blanking cap side and bottom view *Cylinder position and firing order*

Due to the engine layout the #2 Ignition trigger was the easiest to pick up



The coolant pressure pulse is significantly higher during the #3 cylinder combustion cycle, indicating that there appears to be an issue with some combustion pressure entering the cooling system in the vicinity of #3 cylinder.

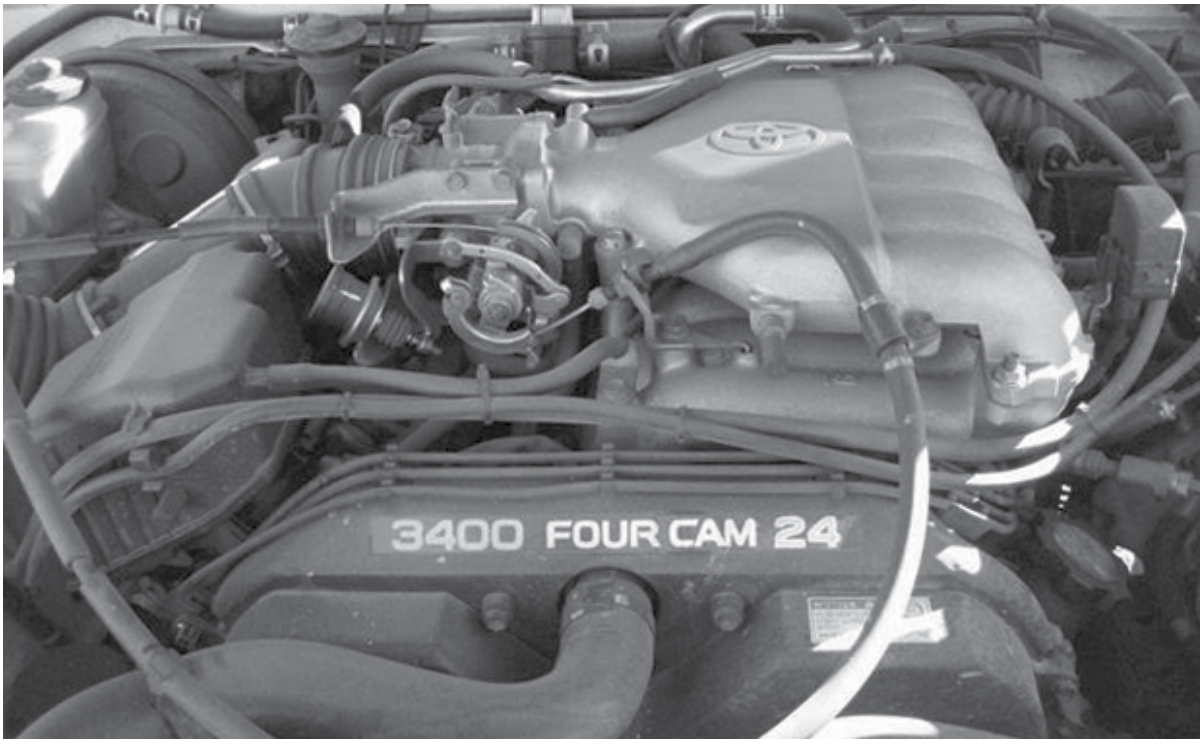
CASE STUDY #2 continued...



After removing the Intake Manifold there was crystallised coolant at the head gasket adjacent to #3

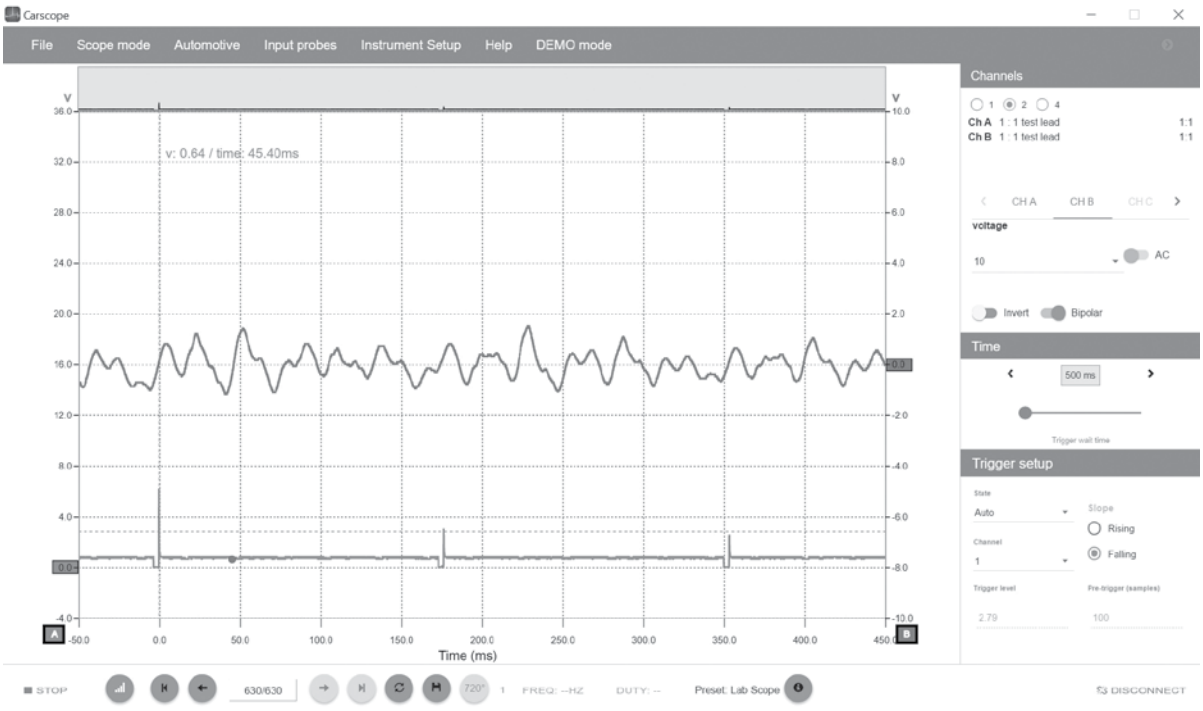
CASE STUDY #3

2005 Toyota Hilux VZN167R (5VZ-FE engine)



This old Hilux had a long life with over 500K kms on the odometer. The customers complaint was a misfire under load. The technician inspected the coils and leads before replacing the spark plugs but it did not resolve the issue.

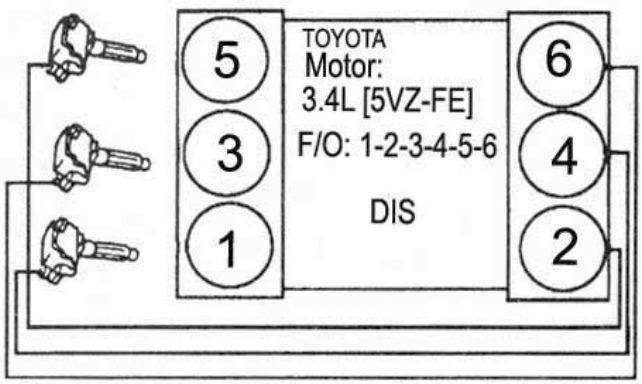
First test:
Attached the pressure pulse sensor to the exhaust tail pipe, result inconclusive.



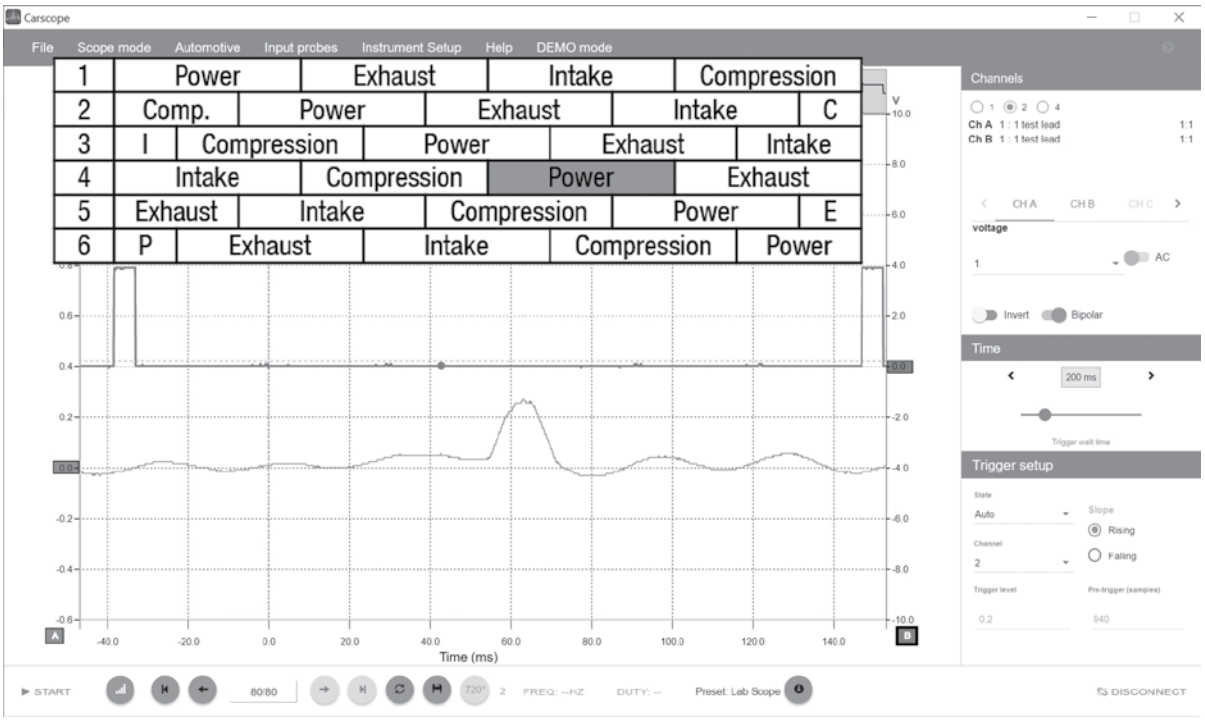
CASE STUDY #3 continued...

Second test:

Attached the pressure pulse sensor to the oil dipstick tube.
By overlaying a Combustion Cycle Table we can identify that the crankcase pressure pulse is synchronised with the Cylinder #4 Power stroke.



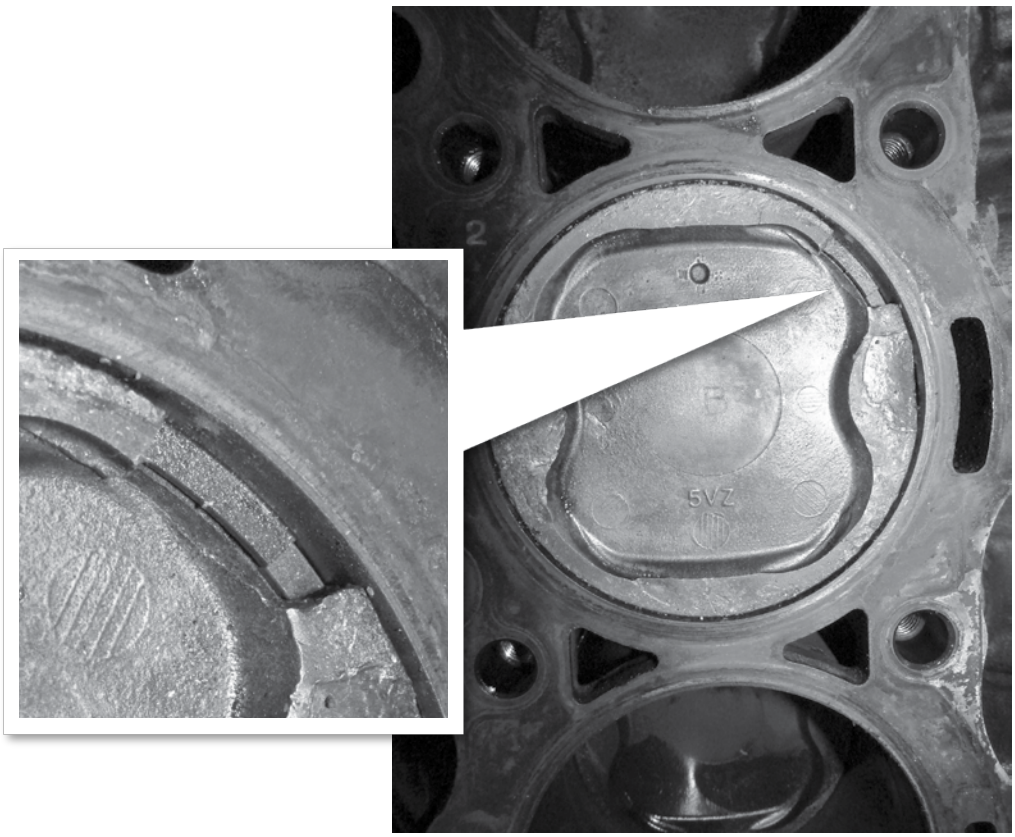
Left: Pressure pulse sensor connected to dipstck tube
Right: Cylinder position and firing order



There is a clear difference between the crankcase pressure pulse on #4 in comparison with the other 5 cylinders

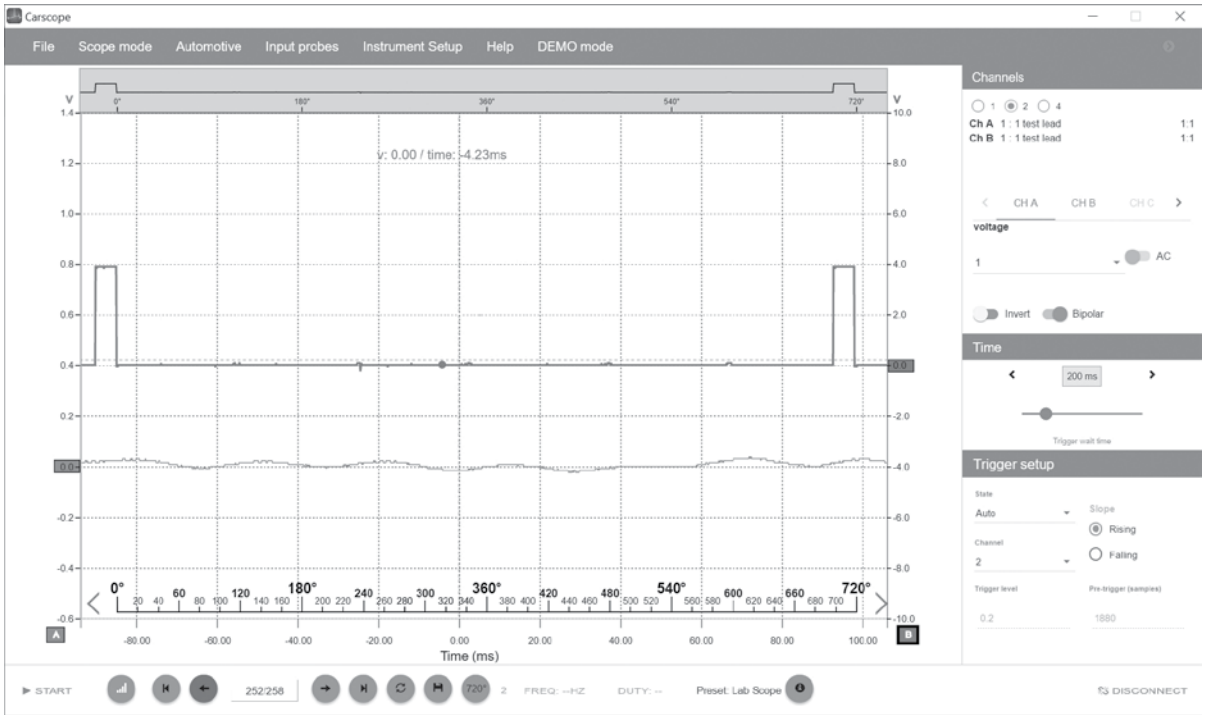
CASE STUDY #3 continued...

Result



Broken piston on #4 cylinder

Verification



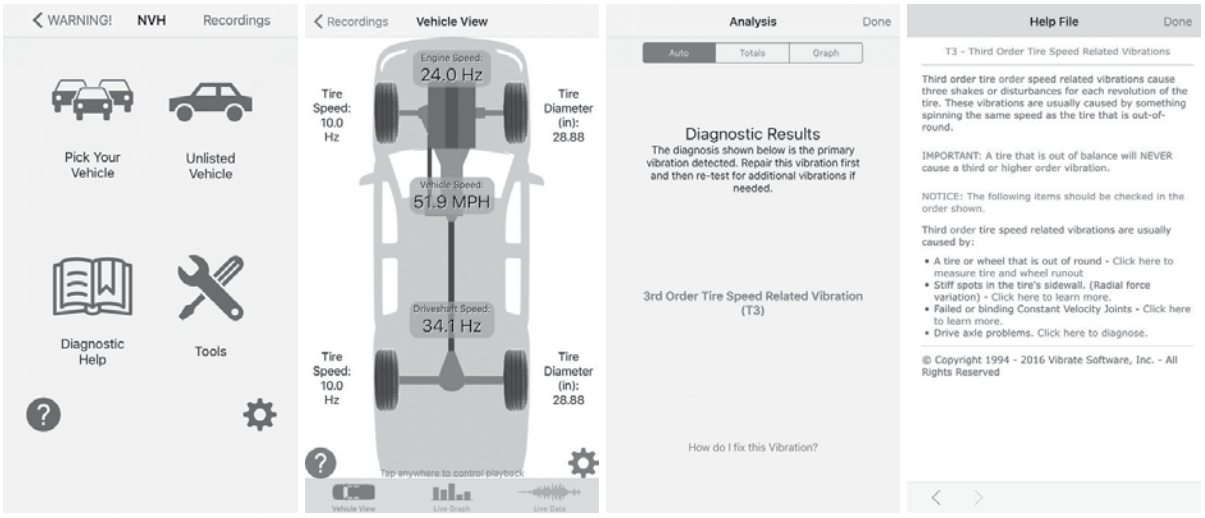
After a 2nd hand engine was fitted the test was repeated

DRIVELINE DIAGNOSIS

Vibration is the cyclic or oscillating movement of an object, which usually produces a noise. The noise may come from the vibration source, or the vibration may transfer to another point where the sound is generated. Having a knowledge of how vibrations are generated in the driveline will reduce diagnostic time and incorrect diagnosis. Because noises and vibrations are often intertwined they are normally called NVH (Noise, Vibration and Harshness).

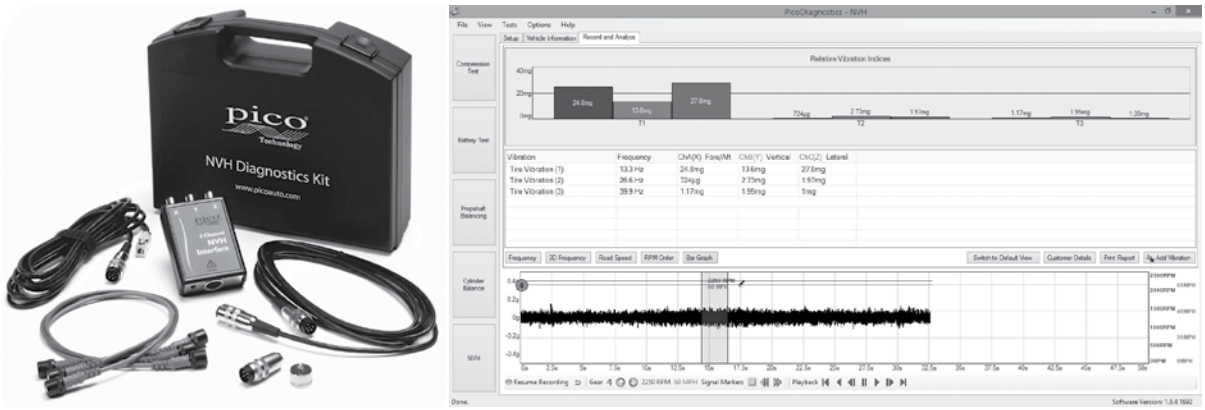
Phone and Tablet Apps

There are a few automotive specific apps for devices that have a built in accelerometer.


WARNING!
NVH
Recordings
Pick Your Vehicle
Unlisted Vehicle
Diagnostic Help
Tools
Recordings
Vehicle View
Engine Speed:
24.0 Hz
Tire Speed:
10.0 Hz
Tire Diameter (in):
28.88
Vehicle Speed:
51.9 MPH
Driveshaft Speed:
34.1 Hz
Tire Speed:
10.0 Hz
Tire Diameter (in):
28.88
Tap anywhere to control playback
Analysis
Done
Auto
Totals
Graph
Diagnostic Results
The diagnosis shown below is the primary vibration detected. Repair this vibration first and then re-test for additional vibrations if needed.
3rd Order Tire Speed Related Vibration (T3)
How do I fix this Vibration?
Help File
Done
T3 - Third Order Tire Speed Related Vibrations
Third order tire order speed related vibrations cause three shakes or disturbances for each revolution of the tire. These vibrations are usually caused by something spinning the same speed as the tire that is out-of-round.
IMPORTANT: A tire that is out of balance will NEVER cause a third or higher order vibration.
NOTICE: The following items should be checked in the order shown.
Third order tire speed related vibrations are usually caused by:
• A tire or wheel that is out of round - Click here to measure tire and wheel runout
• Stiff spots in the tire's sidewall. (Radial force variation) - Click here to learn more.
• Failed or binding Constant Velocity Joints - Click here to learn more.
• Drive axle problems. Click here to diagnose.
© Copyright 1994 - 2016 Vibrate Software, Inc. - All Rights Reserved

PC Based Vibration Analysis

The tool is designed specifically for automotive use and uses the 16 pin DLC connector to read engine speed and requires a Picoscope to connect to a PC. The user interface allows for the custom programming of tyre size and final drive ratio, with advanced options for gear ratios, accessory pulley sizes and more.



DRIVELINE DIAGNOSIS continued...

Diagnosing the cause of vibrations

When a vehicle has a vibration it will have a certain frequency (Hz) that will be most evident at a specific speed. By calculating the tyre diameter, differential ratio, gear ratio, engine speed and number of cylinders it is possible to identify the source of the vibration/s.

Three groups of vibrations:

- Tyre speed related (T)
- Driveshaft speed related (D)
- Engine speed related (E)

Tyre speed vibrations (T#)

Tyre speed vibrations occur at an order of vibration related to the tyre speed. This includes all components between the driven gear (crown wheel) of the final drive/s and the tyres.

Order	Tips
First (T1)	1. Tyre out of round 2. Tyre out of balance 3. Rim out of round 4. Radial force variation 5. Brake runout 6. Hub runout 7. Wheel stud circle runout 8. Axle issues
Second (T2)	1. Tyre out of round 2. Tyre force variation 3. Axle issues
Third (T3)	1. Tyre out of round 2. Tyre force variation 3. Faulty inner CV Joint (tripod type)
Sixth (T6)	• Tyre out of round • Tyre force variation • Faulty inner or outer CV Joint (double offset type)
Other (Tx)	Bearing and gear failures may produce other vibration orders. A general rule is that if the tyre and wheel have been ruled out, the Tx issue will be bearing or gear related • Tyre out of round • Tyre force variation • Bearing failure • If you know how many teeth are on the differentials crown wheel it will be possible to calculate the vibration orders a fault will generate: 4.100:1 = 41 tooth crown wheel and 10 tooth pinion, a crown wheel fault will generate a T41 vibration.

DRIVELINE DIAGNOSIS continued...

Driveshaft speed vibrations (D#)

Driveshaft speed vibrations occur at an order of vibration related to the driveshaft speed. This includes all components between the output shaft of the transmission and the pinion gear of the final drive/s.

Note: *The Driveshaft refers to the shaft connecting the Transmission/Transfer to the Differential!*

Caution: *A CV Shaft (Axle Shaft) turns at wheel speed and therefore creates tyre speed related vibrations!*

Note: *When the vehicles transmission and transfer case (if fitted) are in 1:1 gear ratio/s, the Driveshaft and Engine speeds are synchronised!*

Order	Tips
First (D1)	• Excessive driveshaft runout • Driveshaft out of balance • Differential input shaft runout • Transmission output shaft runout
Second (D2)	• Faulty Universal Joint/s • Faulty Engine/Transmission mount/s • Driveshaft phasing error • Twisted driveshaft • Excessive driveshaft angles (U-Joint type)
Third (D3)	• Faulty CV Joint/s (tripod type) • Excessive driveshaft angles (CV Joint type)
Sixth (D6)	• Faulty CV Joint (double offset type) • Faulty Flex Joint
Other (Dx)	• Bearing failure • If you know how many teeth are on the differentials pinion gear it will be possible to calculate the vibration orders a fault will generate: 4.100:1 = 41 tooth crown wheel and 10 tooth pinion, a pinion gear fault will generate a D10 vibration.

DRIVELINE DIAGNOSIS continued...

Engine speed vibrations (E#)

Engine speed vibrations occur at an order of vibration related to the engine RPM. This includes all internal engine components as well as all components being driven off the crankshaft (this includes the harmonic balancer and the driveplate/flywheel).

Order	Tips
Half (E0.5)	• Single cylinder misfire • Camshaft/Phaser out of balance
First (E1)	• Faulty engine, transmission or exhaust mounts • Tight/stiff cables or hoses transferring normal vibrations to the body • Harmonic Balancer out of balance • Flywheel/Clutch out of balance • Driveplate/Torque Converter out of balance • Crankshaft out of balance
One and One Half (E1.5)	• Normal combustion vibration from 3 cylinder engine • Faulty engine, transmission or exhaust mounts • Tight/stiff cables or hoses transferring normal vibrations to the body
Second (E2)	• Normal combustion vibration from 4 cylinder engine • Faulty engine, transmission or exhaust mounts • Tight/stiff cables or hoses transferring normal vibrations to the body • Balance shaft timing error
Two and One Half (E2.5)	• Normal combustion vibration from 5 cylinder engine • Faulty engine, transmission or exhaust mounts • Tight/stiff cables or hoses transferring normal vibrations to the body
Third (E3)	• Normal combustion vibration from 6 cylinder engine • Faulty engine, transmission or exhaust mounts • Tight/stiff cables or hoses transferring normal vibrations to the body
Fourth (E4)	• Normal combustion vibration from 8 cylinder engine • Faulty engine, transmission or exhaust mounts • Tight/stiff cables or hoses transferring normal vibrations to the body
Other (Ex)	• Belt driven accessories • Gear driven accessories

SUMMARY

Diagnostic Triage consists of the following steps:

1. Completing the diagnostic checklist with the customer
2. Checking the battery
3. Connecting a battery stabiliser
4. Checking, recording and analysing DTCs
5. Checking ground circuits
6. Utilising a smoke generator
7. Utilising a pressure pulse sensor
8. Utilising vibration diagnostic software.

SPECIAL SERVICE TOOLS (SSTs)

Brand	Part #	Applications	Image
Endeavour	ET8636	Conductance Battery Tester with printer	
Repco	RMM770	Multimeter	
Endeavour	ET9420	Voltage Stabiliser/Maintainer	
Mount-Autoland	PS-M1	Voltage Stabiliser/Maintainer	
Endeavour-Foxwell	GT90	Scan Tool	

SPECIAL SERVICE TOOLS (SSTs) continued...

Brand	Part #	Applications	Image
GIT	G-scan 3	Scan Tool	
VCDS	HEX-NET	VW Group Scan Tool	
Endeavour	ET5006	Smoke Generator	
Endeavour	ET5701	Smoke Generator	
Endeavour-Carscope	ET0103S	4 Channel Oscilloscope	
Endeavour-Carscope	ET0096	Pressure Pulse Sensor	
PicoScope	P4425A	4 Channel Oscilloscope	
Mount-SenX	TA014	FirstLook Sensor	
PicoScope NVH Diag	NVH Kit 3ch NVH Kit 4ch	NVH accelerometer kit for PicoScope	

Diagnostic Questionnaire

Customer _____

Vehicle _____ Rego _____

☐ MIL ON ☐ Warning light _____ ☐ Warning message_____

Engine

☐ Hard to start ☐ Starts and stalls ☐ Rough Idle ☐ Idle speed high

☐ Idle speed low ☐ Stalls ☐ Hesitation ☐ Surge

Excessive exhaust smoke Loss of power Stalls ☐ Engine knock

- ☐ Black ☐ under load ☐ at idle ☐ Running on
- ☐ Grey-Blue ☐ at high speed ☐ while driving ☐ Backfire
- ☐ White ☐ continuously restarts easily YES / NO ☐ Poor fuel economy

Transmission

Engagement felt ☐ Harsh upshift Shift lever position

- ☐ Reverse ☐ Harsh downshift ☐ Park ☐ Drive
- ☐ Drive ☐ Hesitation ☐ Reverse ☐ Other_____
- ☐ No drive (slippage) ☐ Vibration ☐ Neutral

Driveline

Noises

- ☐ Squeak ☐ Click
- ☐ Squeal ☐ Growl
- ☐ Hum ☐ Clunk
- ☐ Hiss ☐ Whir
- ☐ Grinding ☐ Whine
- ☐ Knock ☐ Other _____
- ☐ Rattle

Vibrations

- ☐ Steering Wheel
- ☐ Brake Pedal
- ☐ Gear lever
- ☐ Seat
- ☐ Body
- ☐ Other _____

Location

Occurance

Frequency

- ☐ Intermittent
- ☐ Continuous
- ☐ Started _____kms ago
- ☐ Since last repair

Engine Temperature

- ☐ Cold start
- ☐ Warming up
- ☐ Normal
- ☐ Hot (above normal)

Fuel Tank Level

- ☐ Low
- ☐ Mid _____%
- ☐ Full
- ☐ Any

Weather

- ☐ Cold
- ☐ Hot
- ☐ Rain/Wet

details _____

☐ Braking ☐ Decelerating ☐ Cruising ☐ Accelerating

☐ Traffic (stop and go) ☐ Cornering ☐ Accessory ON _____ ☐ Towing

☐ Smooth roads ☐ Rough roads ☐ Dirt roads ☐ Off-road

☐ Vehicle speed _____km/h ☐ Engine speed _____rpm ☐ Specific gear _____ ☐ Cruise Control ON / OFF

Other

Driving Habits

- ☐ City traffic (stop/start)
- ☐ Highway
- ☐ Avg. trip_____kms

Fuel Type

- ☐ 91 ☐ 95 ☐ 98
- ☐ E10 ☐ E85
- ☐ Diesel ☐ LPG

Fuel Brand _____

Has someone else attempted to repair this issue? YES / NO

Details:

_____

Notes:

Section ii

J2534 Programming Revisited

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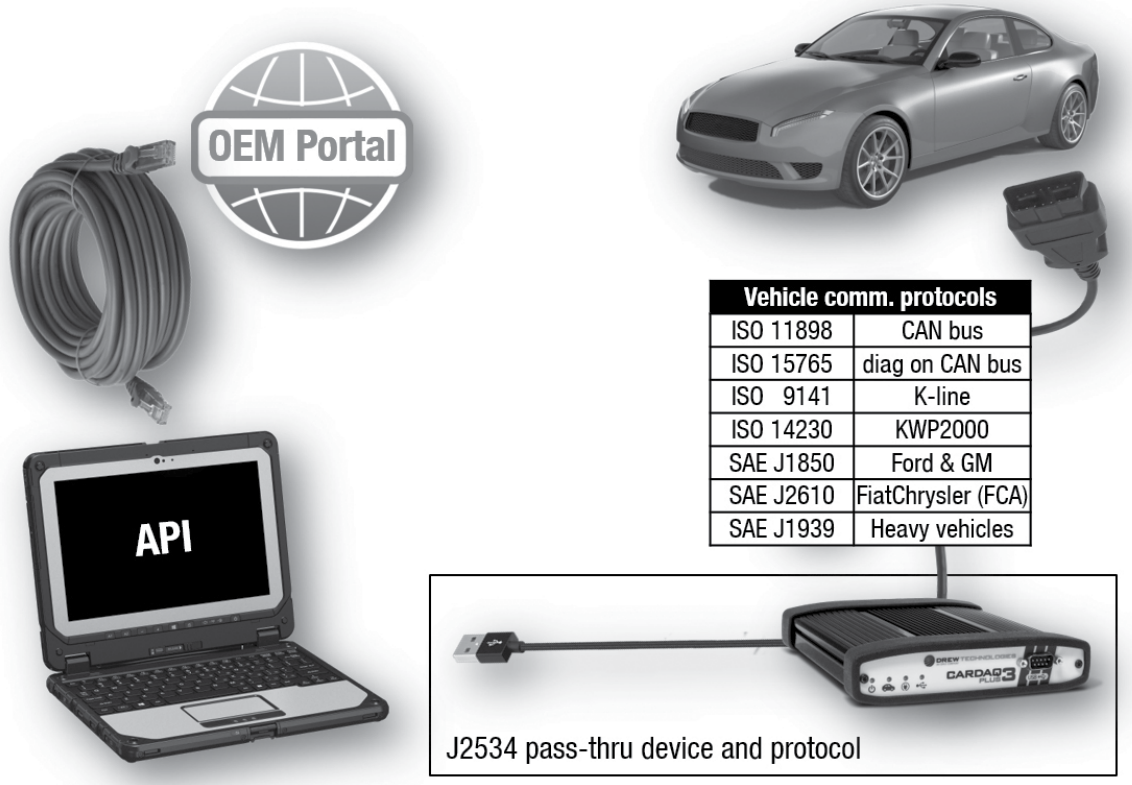
INTRODUCTION

J2534 is a universal reprogramming standard that was initiated back in 1996. The J2534 API is governed globally by the SAE (Society of Automotive Engineers). API is the acronym for Application Programming Interface which is the gateway to allow different technologies to communicate with each other, for J2534 this refers to the OEM portal on a PC and the vehicle ECU/s. The tool used to create the connection is called a J2534 Pass-thru Device.

In order to perform a software update using J2534 you'll need:

- A windows O/S PC, with:
  - a reliable internet connection (ethernet cable recommended)
  - the appropriate vehicle manufacturers API installed
  - and the drivers installed for J2534 pass-thru device
- A J2534 pass-thru device
- A paid subscription to the OEM portal



J2534 pass-thru device and protocol

J2534 LEGISLATION

The two largest jurisdictions, United States (US) with its Right to Repair (R2R) campaign being legislated in 2006 and more relevantly to Australia, the European EOBD Euro5 Standard being implemented in 2009 under Article 6(2) of European Commission Regulation (EC) No. 715/2007. Together these regions have influenced the global platform for vehicle software updates.

There is a key difference between the two platforms:

- US, the Right to Repair (R2R) is a consumer rights law
- Europe, is part of the vehicle standard

Unfortunately for Australia's aftermarket industry when the Euro5 standard was phased into Australian Law (ADR 79/04) only the emission standard was used.

The Australian aftermarket repair industry is still in limbo in relation to Original Equipment (OE) repair information and vehicle software updating. Many manufacturers are now providing some form of paid subscription for vehicle specific information however the J2534 programming component is lagging. The Australian Automotive Aftermarket Association (AAAA) are working hard with the federal government to develop the mandatory data sharing laws (Choice of Repairer campaign), most manufacturers are waiting until they are required by law before providing programming information and at the time of publication there is still no date set for the introduction of these laws that were tabled in October 2019.

The Federal Chamber of Automotive Industries (FCAI) who represent vehicle manufacturers in Australia developed a Voluntary Code of Practice (VCoP) for 'Access to Service and Repair Information for Motor Vehicles' which was an unsuccessful attempt to deter the government from implementing a mandatory data sharing law.

The VCoP was implemented in Febraury 2015 and expired after 5 years. It is under this agreement that some manufacturers are providing data.

AUSTRALIAN J2534 PORTALS

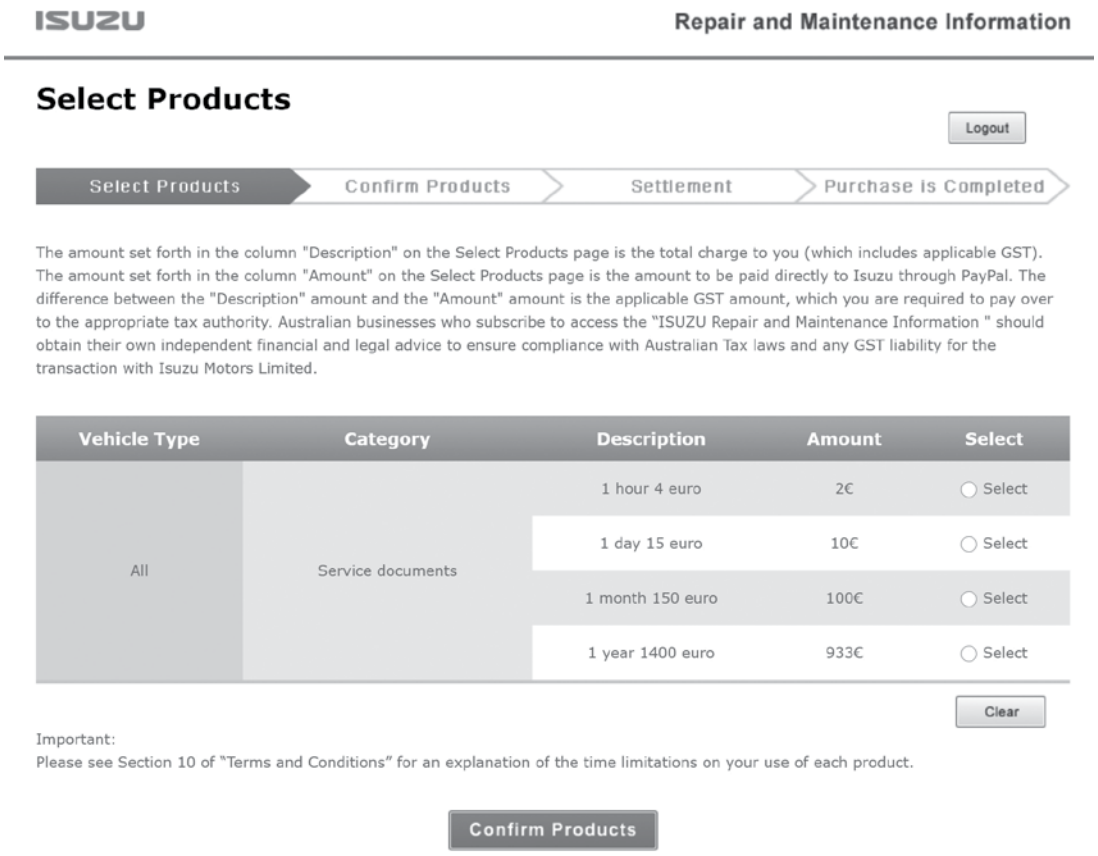
Australian Portals
The following manufacturers have open J2534 programming portals that can be accessed at relatively low costs on hourly, daily, monthly and yearly rates:

- Holden
- Hyundai
- Kia (although our testing has found that only certain VIN's are supported)

European Portals
Many of the European manufactures allow Australian workshops to apply for access to their portals, if the workshops meet the OE requirements and pay for the portal access, they may be allowed access. Due to the process this option is only justifiable for workshops on a limited number of vehicle makes.

Rest of World Portals
A third tier of programming options can be found on some OE technical websites (predominantly Japanese makers) in their native country. Where it may be possible to find a 'Rest of World' option. Through our testing the portals are operational but often blocks updates when the VIN identifies the location of the vehicle being Australia.

Example
Isuzu's Australian website only provides vehicle service information

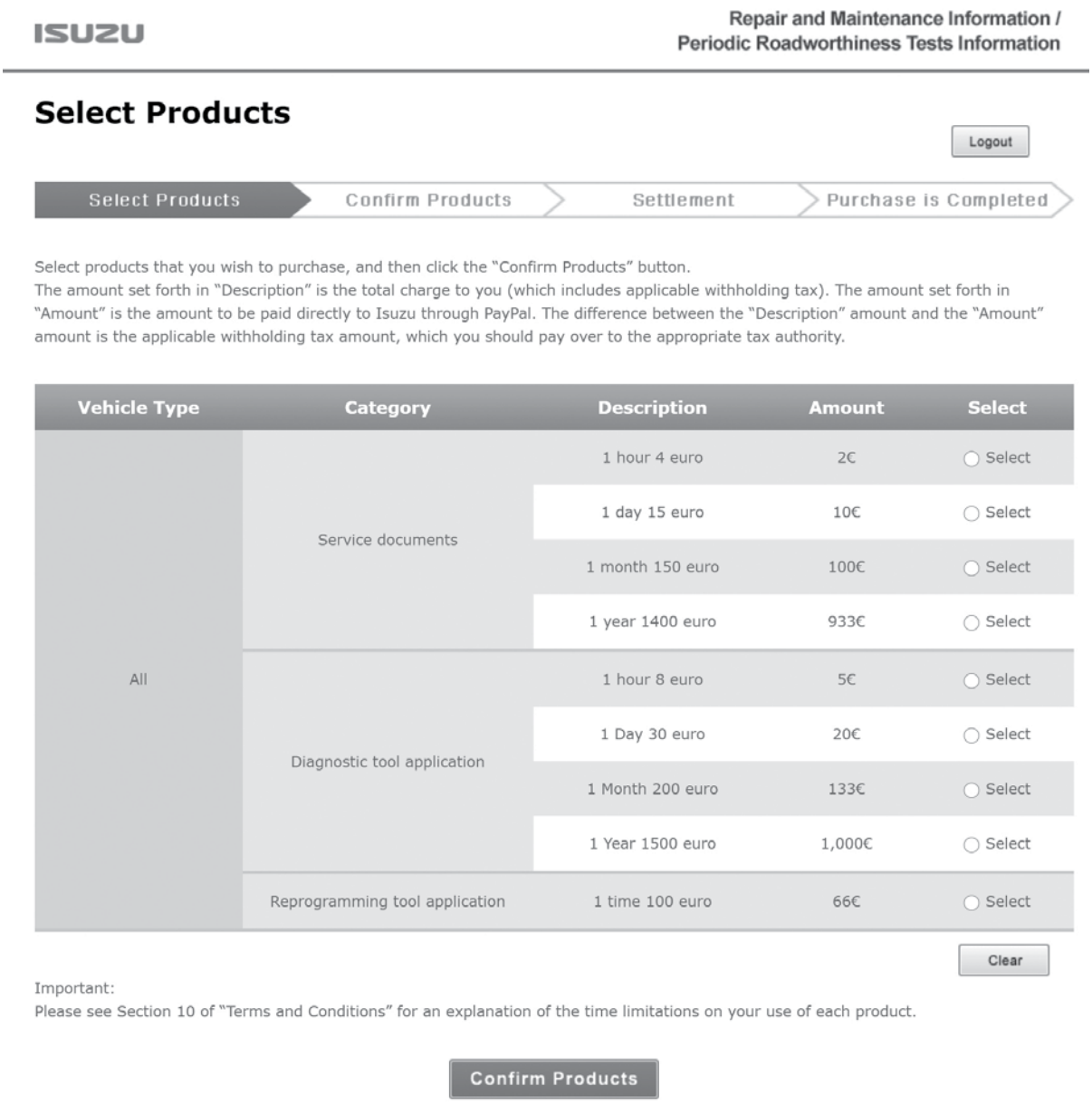

ISUZU
Repair and Maintenance Information
Select Products
Logout
Select Products
Confirm Products
Settlement
Purchase is Completed
The amount set forth in the column "Description" on the Select Products page is the total charge to you (which includes applicable GST). The amount set forth in the column "Amount" on the Select Products page is the amount to be paid directly to Isuzu through PayPal. The difference between the "Description" amount and the "Amount" amount is the applicable GST amount, which you are required to pay over to the appropriate tax authority. Australian businesses who subscribe to access the "ISUZU Repair and Maintenance Information " should obtain their own independent financial and legal advice to ensure compliance with Australian Tax laws and any GST liability for the transaction with Isuzu Motors Limited.
Vehicle Type
Category
Description
Amount
Select
All
Service documents
1 hour 4 euro
2€
Select
1 day 15 euro
10€
Select
1 month 150 euro
100€
Select
1 year 1400 euro
933€
Select
Clear
Important:
Please see Section 10 of "Terms and Conditions" for an explanation of the time limitations on your use of each product.
Confirm Products

https://rmi-au.isuzu.co.jp/world/repair/users/login

AUSTRALIAN J2534 PORTALS continued...

The Isuzu Japan website has a Rest of World (RoW) option which provides:

- Service Documents
- Access to OE diagnostic tool
- J2534 programming



https://isuzu-euro5.isuzu.co.jp/world/repair/users/login

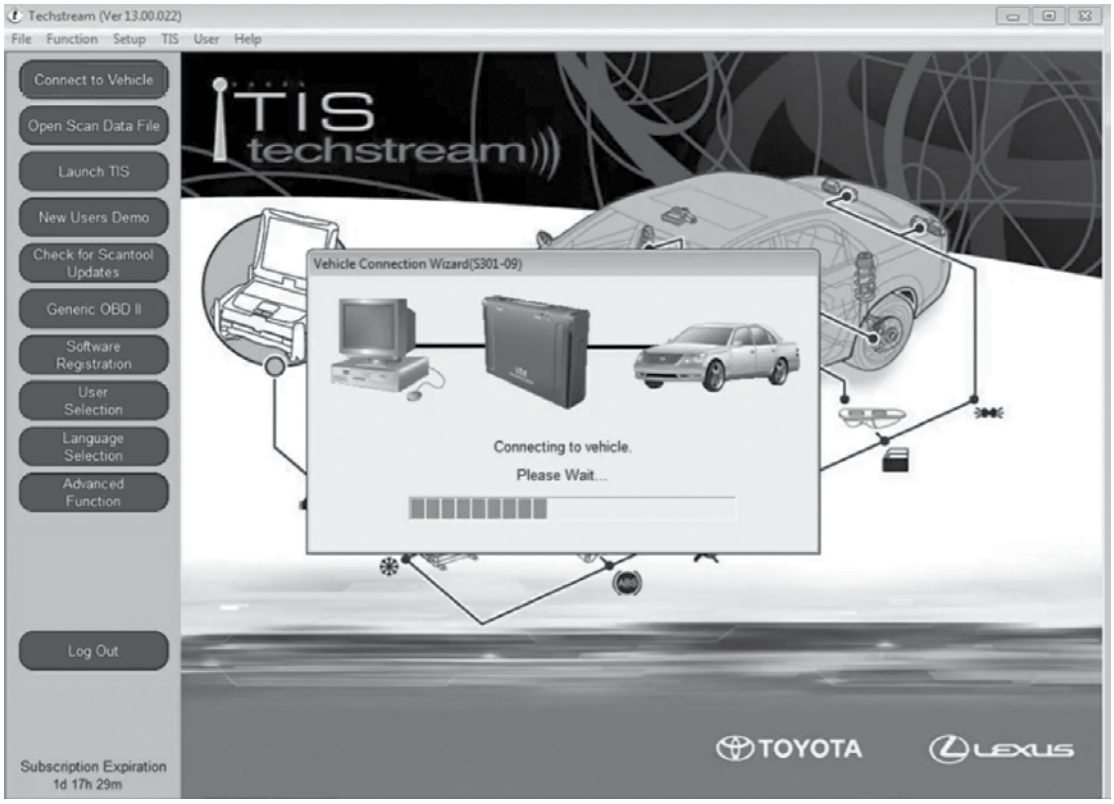
WHEN TO DO A SOFTWARE UPDATE

There are a variety of reasons for a technician to complete a software update, the most common reasons include:

- Instructed to do so as part of the service schedule
- Instructed to do so by a Technical Service Bulletin (TSB)
- Vehicle has a fault and the technician feels that the software may address the issue

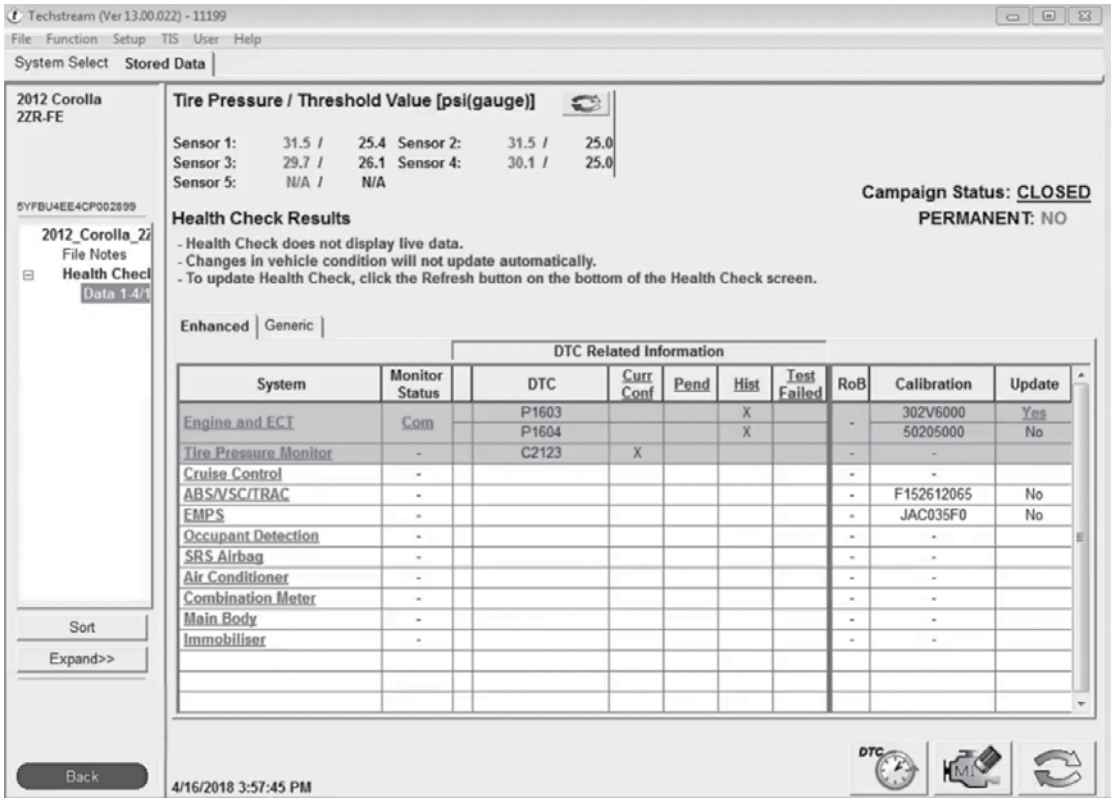
A scenario might look like this:

1. A vehicle comes in for a scheduled service.
2. The service procedure states that a check for software updates is required.
3. Vehicle is connected to the OE portal via a J2534 device

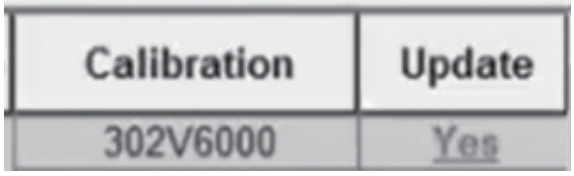


WHEN TO DO A SOFTWARE UPDATE continued...

4. OE portal identifies an update is available for that particular vehicle

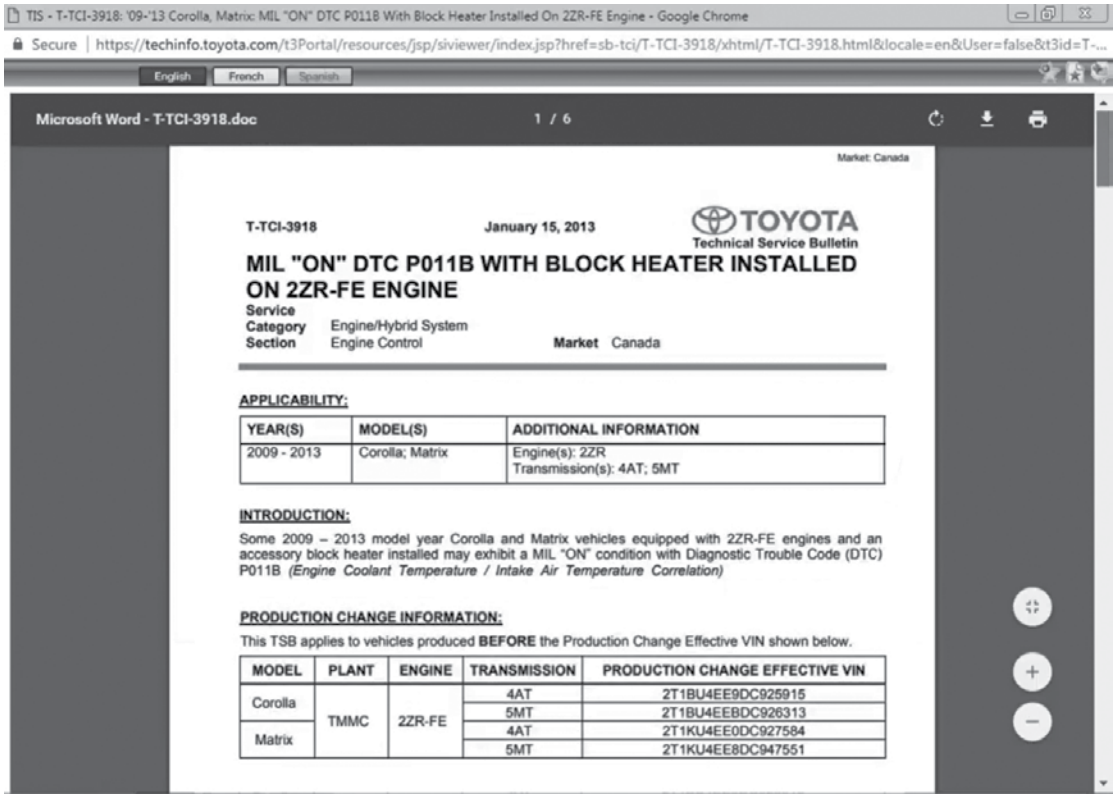


5. The information attached to the update references/links to a TSB

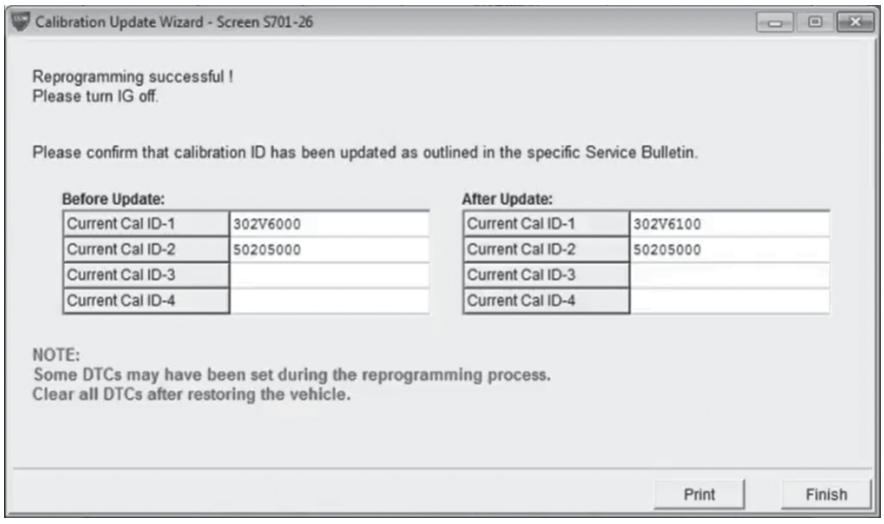


WHEN TO DO A SOFTWARE UPDATE continued...

6. The TSB verifies the reasons, if any, why the update should or should not be carried out


TIS - T-TCI-3918: '09-'13 Corolla, Matrix: MIL "ON" DTC P011B With Block Heater Installed On 2ZR-FE Engine - Google Chrome
Secure | https://techinfo.toyota.com/t3Portal/resources/jsp/siviewer/index.jsp?href=sb-tci/T-TCI-3918/xhtml/T-TCI-3918.html&locale=en&User=false&t3id=T-...
English French Spanish
Microsoft Word - T-TCI-3918.doc
1 / 6
Market: Canada
T-TCI-3918
January 15, 2013
TOYOTA
Technical Service Bulletin
MIL "ON" DTC P011B WITH BLOCK HEATER INSTALLED ON 2ZR-FE ENGINE
Service Category Engine/Hybrid System
Section Engine Control
Market Canada
APPLICABILITY:
YEAR(S) | MODEL(S) | ADDITIONAL INFORMATION
2009 - 2013 | Corolla; Matrix | Engine(s): 2ZR
Transmission(s): 4AT; 5MT
INTRODUCTION:
Some 2009 – 2013 model year Corolla and Matrix vehicles equipped with 2ZR-FE engines and an accessory block heater installed may exhibit a MIL "ON" condition with Diagnostic Trouble Code (DTC) P011B (Engine Coolant Temperature / Intake Air Temperature Correlation)
PRODUCTION CHANGE INFORMATION:
This TSB applies to vehicles produced BEFORE the Production Change Effective VIN shown below.
MODEL | PLANT | ENGINE | TRANSMISSION | PRODUCTION CHANGE EFFECTIVE VIN
Corolla | TMMC | 2ZR-FE | 4AT | 2T1BU4EE9DC925915
5MT | 2T1BU4EEBDC926313
Matrix | 4AT | 2T1KU4EE0DC927584
5MT | 2T1KU4EE8DC947551

7. The software update is completed


Calibration Update Wizard - Screen S701-26
Reprogramming successful !
Please turn IG off.
Please confirm that calibration ID has been updated as outlined in the specific Service Bulletin.
Before Update:
Current Cal ID-1 302V6000
Current Cal ID-2 50205000
Current Cal ID-3
Current Cal ID-4
After Update:
Current Cal ID-1 302V6100
Current Cal ID-2 50205000
Current Cal ID-3
Current Cal ID-4
NOTE:
Some DTCs may have been set during the reprogramming process.
Clear all DTCs after restoring the vehicle.
Print
Finish

Note: *This example is from a Toyota vehicle using the Toyota Techstream. Toyota have yet to launch their J2534 platform in Australia and currently do not provide local access to the Techstream software or TSB information!*

VOLTAGE STABILISING

When connecting the vehicle to the J2534 device and the PC, you will normally be provided with a list of requirements for preparing the vehicle for a software update. While it is essential to follow the manufacturers procedure, the most common and important of these requirements is usually the connection of a voltage stabiliser.

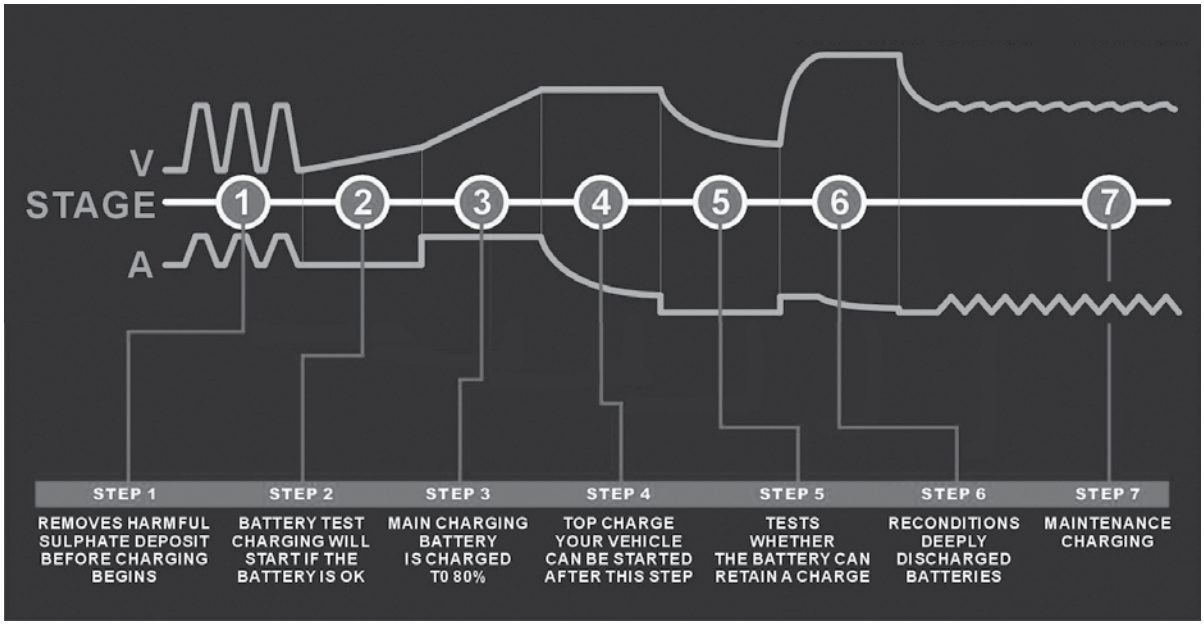
These tools maintain a consistent clean voltage during programming to prevent programming errors. Depending on the vehicle and the processes being carried out, the load will vary but some vehicles can now draw in excess of 100A during programming.

Note: *Voltage instability is the #1 cause of ECU programming failures!*

Important aspects of a voltage stabiliser:

- Voltage maintains consistent regardless of load
- Voltage can be set to the manufacturers desired value

Caution: *Battery chargers do not output a clean waveform and may interrupt the writing process to the ECU!*



As this graphic illustrates, at no time does a battery charger output a steady voltage or current. Battery maintainers or trickle chargers have a constant output as per Step 7.

Caution: *If the programming aborts mid-process it may render the ECU unrecoverable!*

VOLTAGE STABILISING continued...

Programming Voltage
As a general rule Asian derived vehicles are in the 13.4V to 13.6V range
European derived vehicles are in the 14.0V to 15.5V range

In the very early days of module programming manufacturers would have a list of circuits that had to be isolated during programming to prevent voltage drop. Today they rely on voltage stabilisers.

COMMON PROGRAMMING ERRORS

- Failure to complete the prerequisites for programming as outlined by the manufacturer
- PC shuts down, hibernates or sleeps during programming
  – ensure all of these power settings are set to NEVER
- Internet drops out. Ensure you have a reliable connection and connect to the modem using an Ethernet (CAT6) cable
- Pop-up blocker may prevent critical process messages
  – make sure pop-up blocker is OFF
- Windows update, since windows 10 was released you can't turn off updates.
  – make sure that updates are not scheduled during a J2534 event
  – turn update notification ON
  – pause updates immediately prior to programming (and resume immediately after)
- PC user not logged in as administrator
- Only use a J2534 device that is supported for use by the particular manufacturer
- Chrysler and Fiat vehicles will abort programming if voltage exceeds 13.99V
- Nissan vehicles will abort programming if there is excessive electrical noise (such as when a battery charger is used)
- Interruptions during programming such as a door opening
- Vehicles with a push button start may cycle the ignition off if special procedures are not undertaken
  – Holden, press and hold start button (without the brake pedal applied) for 5 seconds
  – BMW, connect the drivers seat belt (BCM thinks occupant in car and leaves ignition ON)
- If an error occurs and the programming is interrupted DO NOT turn the ignition OFF. Cycling the ignition will write the corrupted file to the ECU and may render it unrecoverable.

HOLDEN J2534 PROGRAMMING

Holden and other GM vehicles
In 2019 GM (including Holden) updated the software and procedure for its Service Programming System (SPS). The process now requires a new piece of software to be installed, the J2534 Wrapper.

The J2534 Wrapper is the software that the applications use to manage the VCI (Vehicle Communication Interfaces) and replaces Internet Explorer "Plugins" that were used in the previous version.

With the new software requirement comes a new billing system:

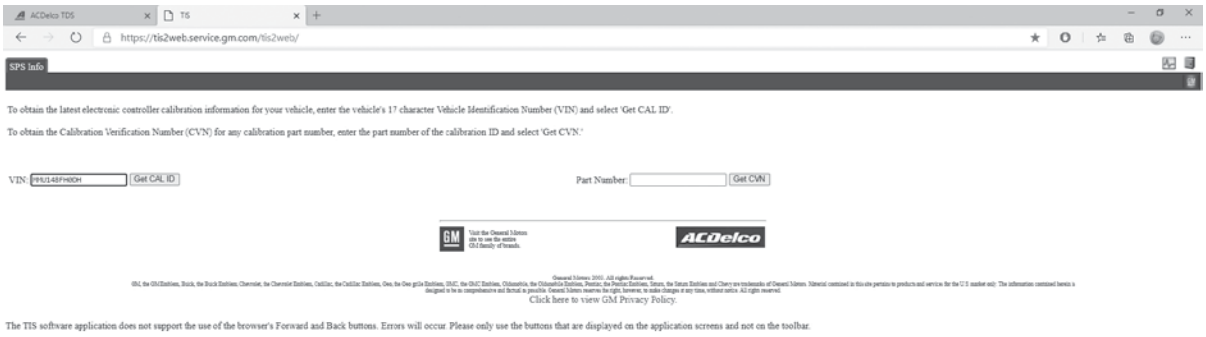
Old SPS fee structure	New SPS fee structure
2 Days Unlimited vehicles A$55	1 vehicle 2 years access A$55
3 Months Unlimited vehicles A$275	4 vehicles 2 years access A$219
1 year Unlimited vehicles A$995	25 vehicles 2 years access A$1368

Note: *GM (including Holden) still offer the free Techline Information System (TIS2Web) service where the latest calibration can be looked up and compared against the current software calibration using a compatible Scan Tool!*

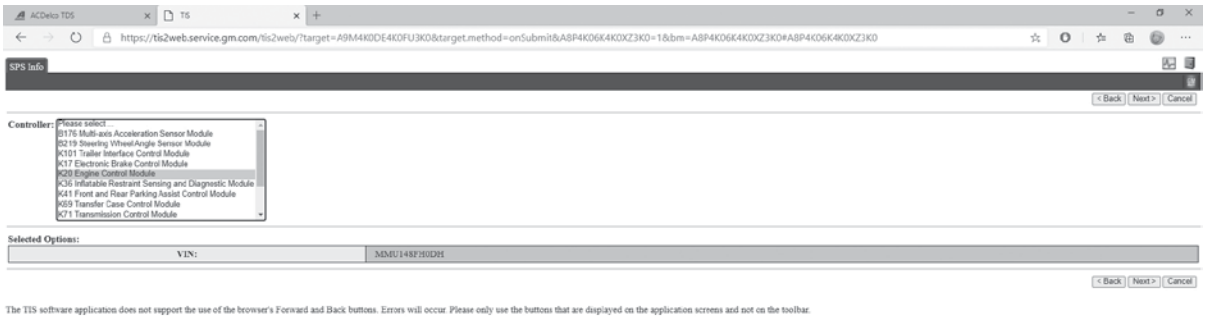
HOLDEN J2534 PROGRAMMING continued...

TIS2Web Procedure

1. Log on to https://tis2web.service.gm.com/tis2web/ and enter the VIN


ACDelco TDS
TS
https://tis2web.service.gm.com/tis2web/
SPS Info
To obtain the latest electronic controller calibration information for your vehicle, enter the vehicle's 17 character Vehicle Identification Number (VIN) and select 'Get CAL ID'.
To obtain the Calibration Verification Number (CVN) for any calibration part number, enter the part number of the calibration ID and select 'Get CVN.'
VIN:
Get CAL ID
Part Number:
Get CVN
ACDelco
Click here to view GM Privacy Policy.
The TIS software application does not support the use of the browser's Forward and Back buttons. Errors will occur. Please only use the buttons that are displayed on the application screens and not on the toolbar.

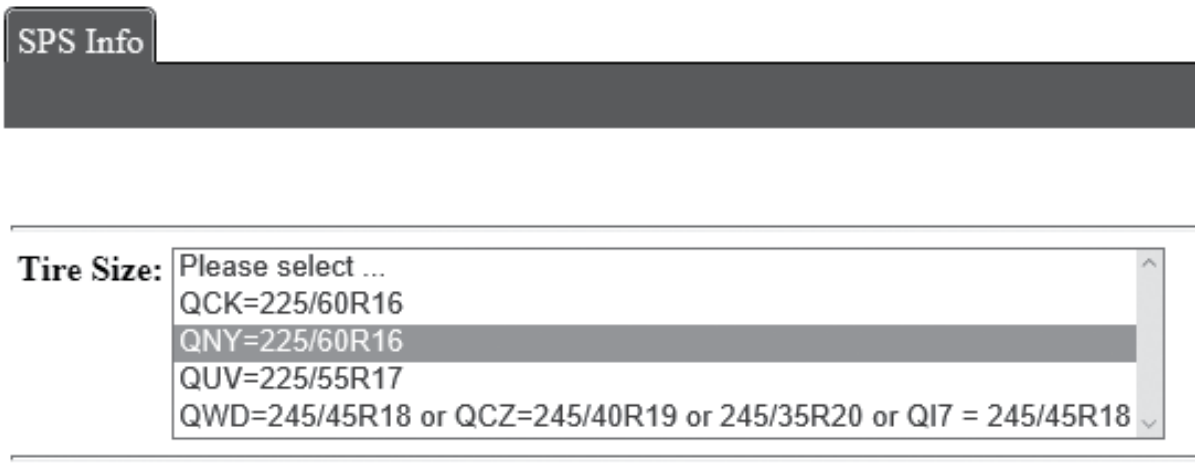
2. Select the ECU that you wish to access


ACDelco TDS
TS
https://tis2web.service.gm.com/tis2web/?target=A9M4K0DE4K0FU3K0&target.method=onSubmit&A8P4K06K4K0XZ3K0=1&bm=A8P4K06K4K0XZ3K0#A8P4K06K4K0XZ3K0
SPS Info
< Back
Next >
Cancel
Controller:
Please select...
B176 Multi-axis Acceleration Sensor Module
B219 Steering Wheel Angle Sensor Module
K101 Trailer Interface Control Module
K17 Electronic Brake Control Module
K20 Engine Control Module
K36 Inflatable Restraint Sensing and Diagnostic Module
K41 Front and Rear Parking Assist Control Module
K69 Transfer Case Control Module
K71 Transmission Control Module
Selected Options:
VIN:
MMU148F H0DH
The TIS software application does not support the use of the browser's Forward and Back buttons. Errors will occur. Please only use the buttons that are displayed on the application screens and not on the toolbar.

HOLDEN J2534 PROGRAMMING continued...

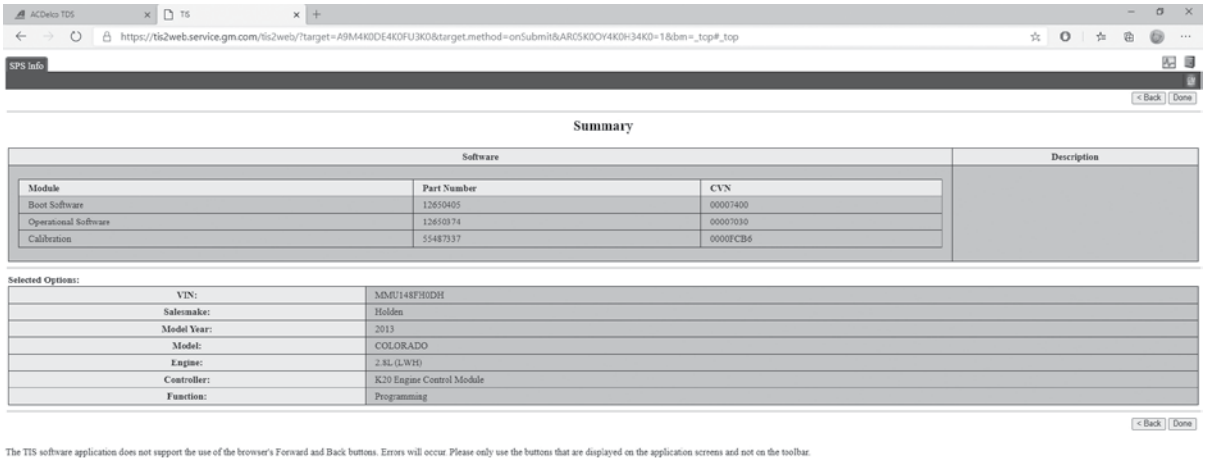
3. Select the function

4. A list of option codes may be presented depending on what variants were available for the VIN provided (e.g. tyre size code).



HOLDEN J2534 PROGRAMMING continued...

5. The ECU information



ACDelco TDS | TIS

https://tis2web.service.gm.com/tis2web/?target=A9M4K0DE4K0FU3K08&target.method=onSubmit&AR05K0OY4K0H34K0=1&bm=_tcp#_top

SPS Info

< Back | Done

Summary

Software			Description
Module	**Part Number**	**CVN**	
Boot Software	12650405	00007400	
Operational Software	12650374	00007030	
Calibration	55487337	0000FCB6	

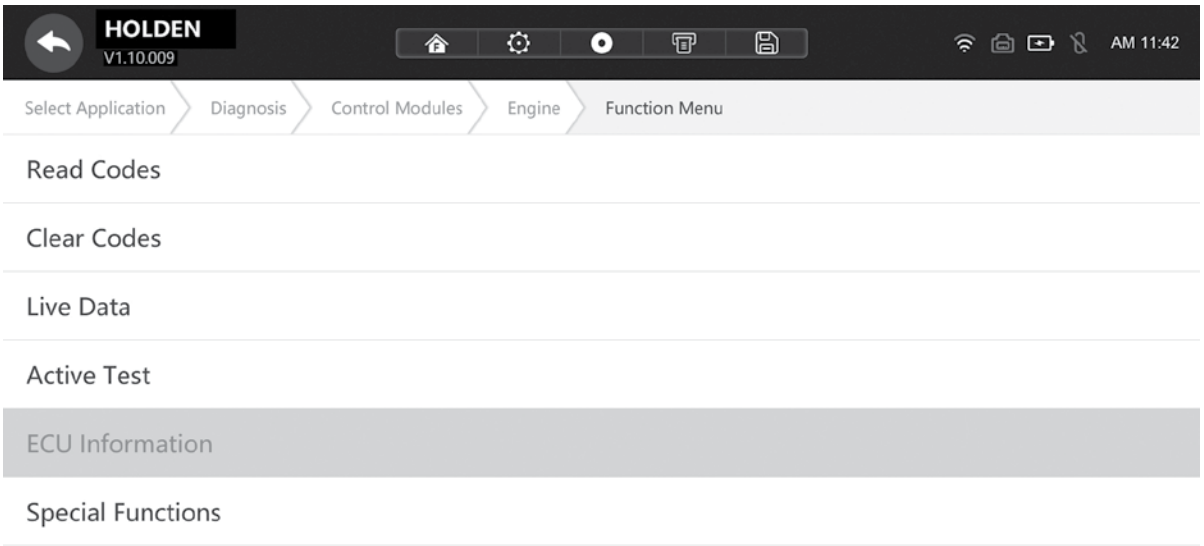
Selected Options:

VIN:	MMU148FH0DH
Salesmake:	Holden
Model Year:	2013
Model:	COLORADO
Engine:	2.8L (LWH)
Controller:	K20 Engine Control Module
Function:	Programming

< Back | Done

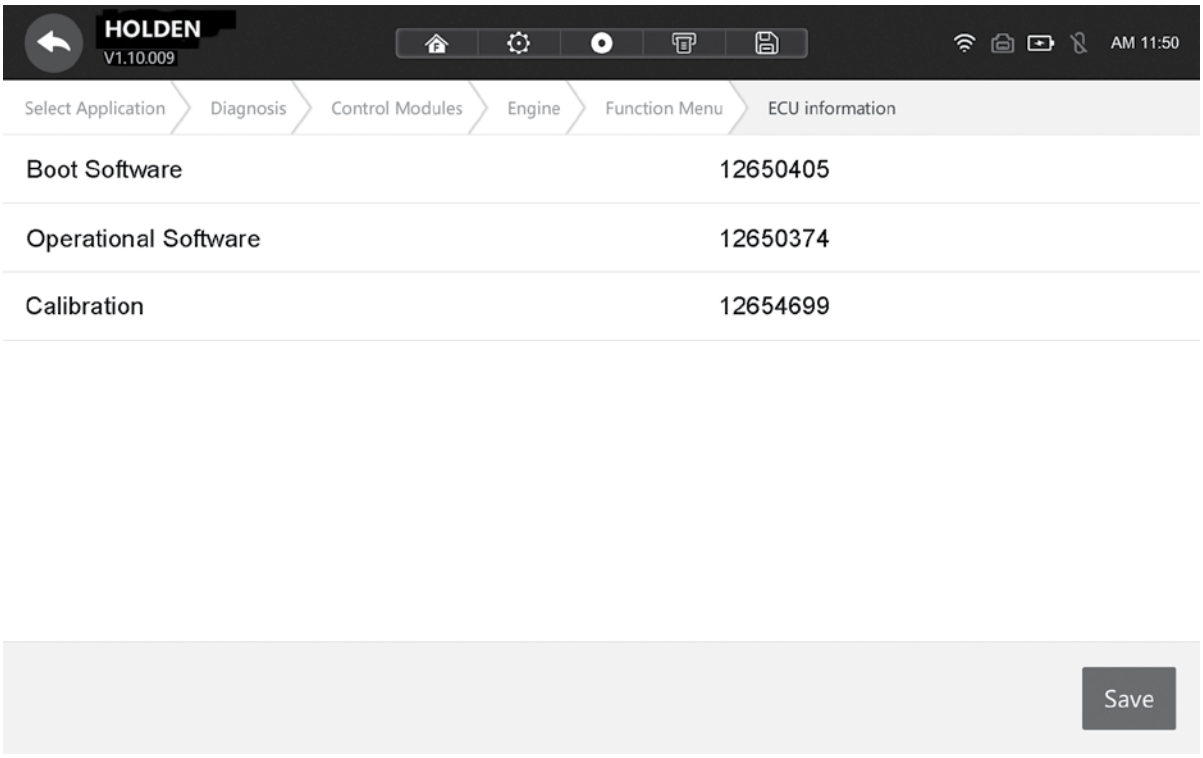
The TIS software application does not support the use of the browser's Forward and Back buttons. Errors will occur. Please only use the buttons that are displayed on the application screens and not on the toolbar.

6. Connect the Scan Tool to the vehicle, Ignition ON and navigate to the "ECU Information"



HOLDEN J2534 PROGRAMMING continued...

7. Compare the vehicles current software codes against the latest codes provided and update the ECM as required. If you should identify that the software is out of date you can use a J2534 Pass-Thru Device along with a subscription to the Holden Service Program Software (SPS) to carry out the update.



8. The difference between the calibration numbers confirms that this vehicle has software update available. The Service Programming System (SPS) is required to carry out the J2534 programming.

Module	Part Number
Boot Software	12650405
Operational Software	12650374
Calibration	55487337

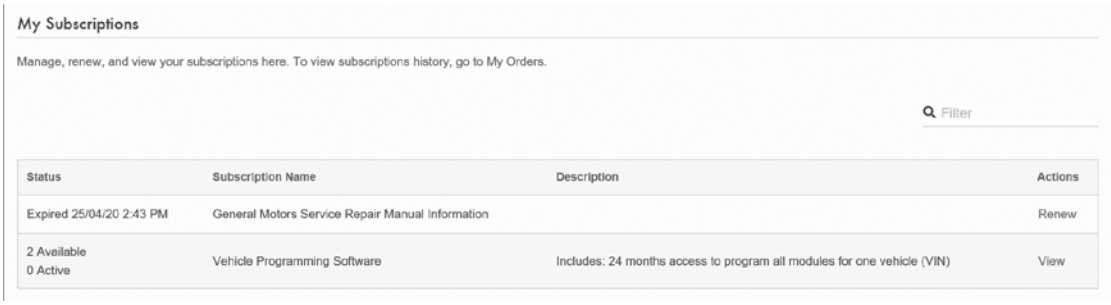
Boot Software	12650405
Operational Software	12650374
Calibration	12654699

The TIS2Web calibration file (left) is a higher number than the calibration file on the ECU (right) indicating that a software update is available.

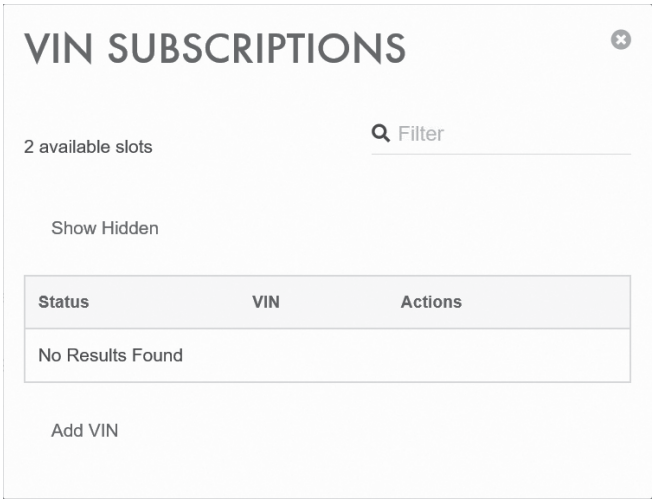
HOLDEN J2534 PROGRAMMING continued...

Holden SPS Procedure

1. Start up the PC and open a web browser
2. Access the General Motors (Holden) Service Information, at the AC Delco Technical Delivery System (TDS) website - https://www.acdelcotds.com/
3. Register or Login to your account
4. Scroll down the page to the **My Subscriptions** Table and select **View**



5. A **VIN SUBSCRIPTIONS** popup will appear, either select the VIN or **Add VIN**



6. This will redirect to the GM TIS2Web website

Note: *You will be presented with information and news updates that vary over time. At the bottom you may check the **Don't show again** box. Once read you can click the **OK** button.*

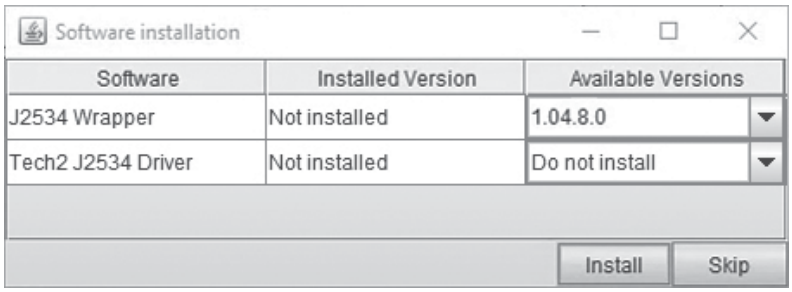
7. Select Service and Programming Information icon

HOLDEN J2534 PROGRAMMING continued...

8. Click on the **Start SPS** button, the Service Programming Software (SPS) application will open

Note: *You may need to install the latest SPS application. Select **Run***

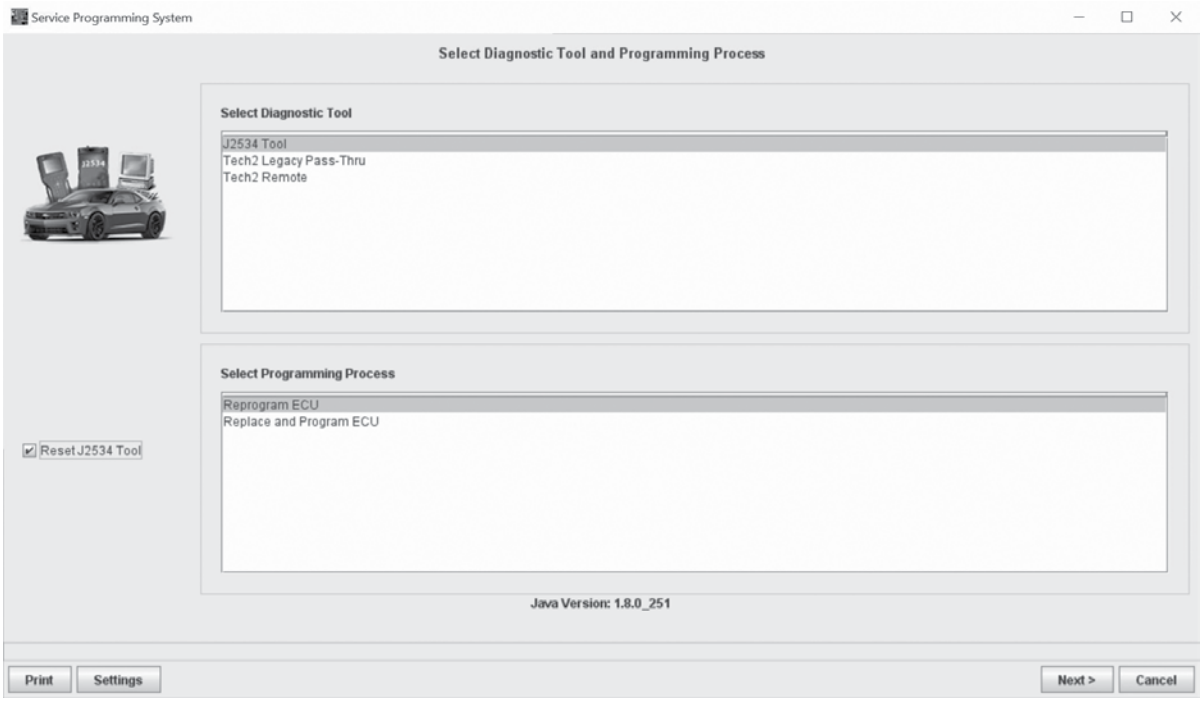
*You may need to install the latest J2534 Wrapper. Click **Install***



9. Select the (J2534) Diagnostic Tool that you want to use for the programming
10. Select the Programming Process:

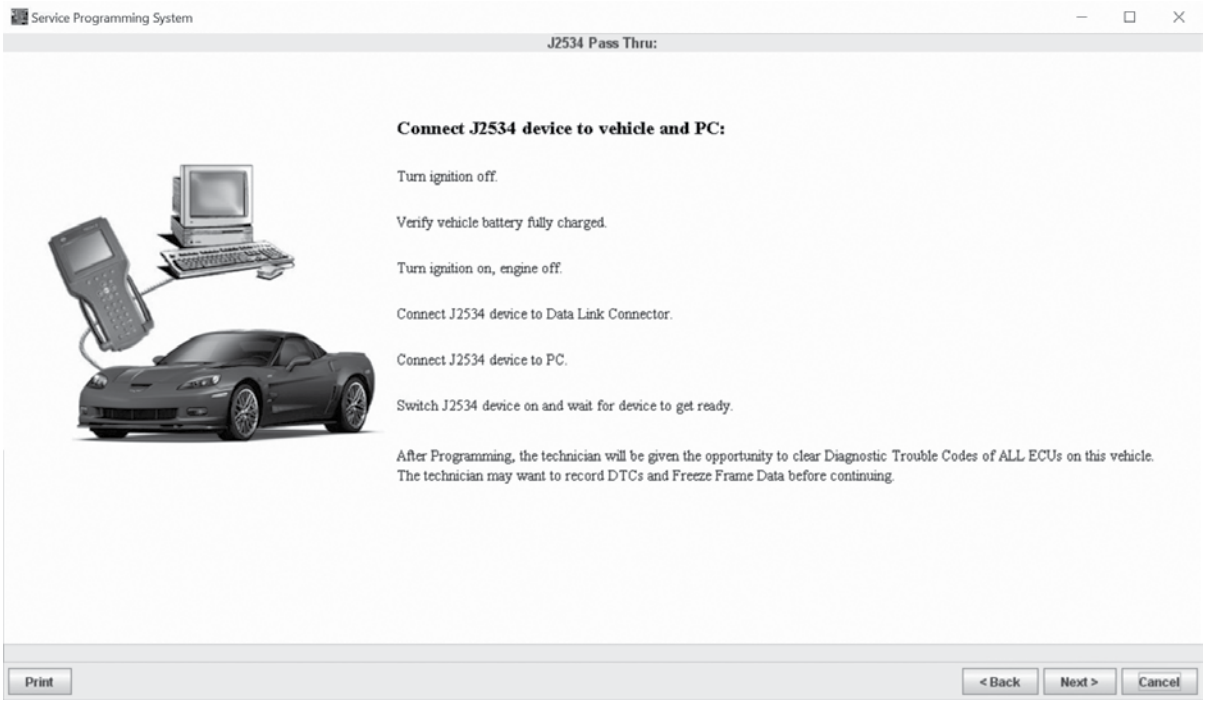
    Reprogram ECU - is used for updating the software in the ECU
    Replace and Program ECU - is used to install a new ECU

11. If you own only one J2534 Pass-thru device for programming Holden's leave the **Reset J2534 Tool** box unchecked, check this box if you have more than one device and want to choose which tool each time



HOLDEN J2534 PROGRAMMING continued...

12. Click the **Next >** button at the bottom of the window
13. The procedure for connecting the vehicle is displayed, ensure that all items are completed in order


Service Programming System
J2534 Pass Thru:
Connect J2534 device to vehicle and PC:
Turn ignition off.
Verify vehicle battery fully charged.
Turn ignition on, engine off.
Connect J2534 device to Data Link Connector.
Connect J2534 device to PC.
Switch J2534 device on and wait for device to get ready.
After Programming, the technician will be given the opportunity to clear Diagnostic Trouble Codes of ALL ECUs on this vehicle.
The technician may want to record DTCs and Freeze Frame Data before continuing.
Print
< Back
Next >
Cancel

Caution: ***Keyless Start Vehicles***
GM have released multiple TSB's regarding programming failures due to the ignition cycling off.

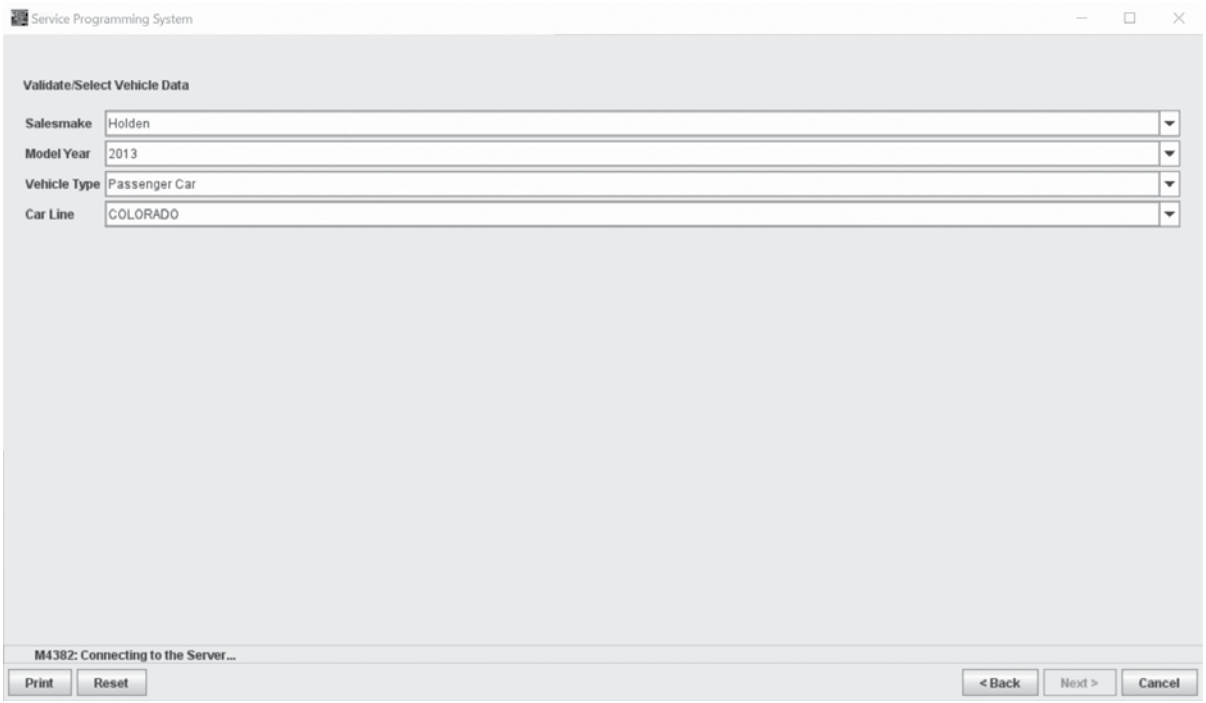
Press and hold the Engine Start/Stop button for 5 Seconds!

Caution: *Auto-Tech recommends using a Voltage Stabiliser to prevent low voltage failures during programming that may result in damage to the ECU's. Some but not all manufacturers require the use of a Voltage Stabiliser!*

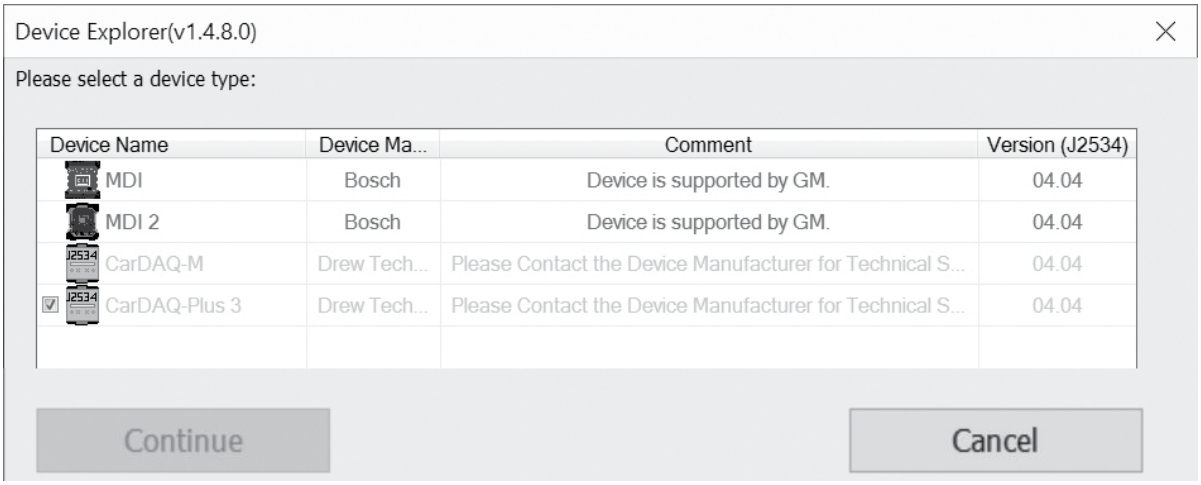
14. Click the **Next >** button at the bottom of the window

HOLDEN J2534 PROGRAMMING continued...

15. Enter the vehicle Make, Model Year, Vehicle Type & Car Line (Model)



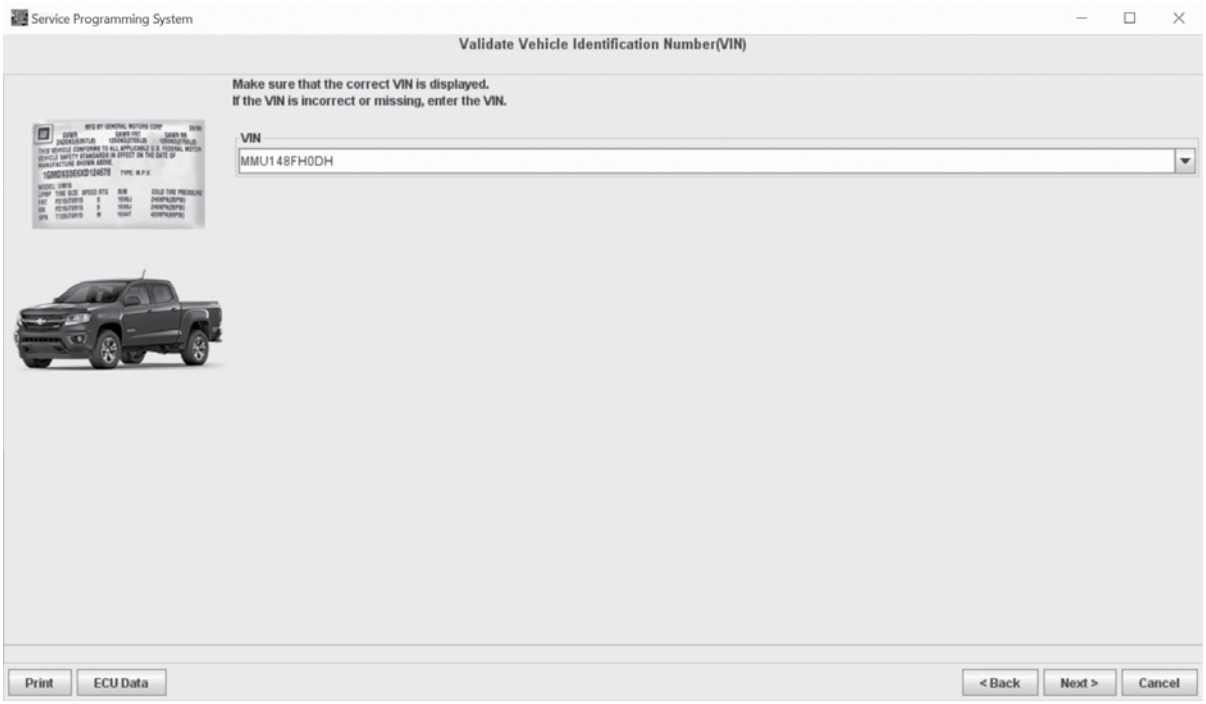
16. Select the device that you wish to use to connect as the gateway between the laptop and the vehicle



Note: *Only J2534 pass-thru devices that have had their software drivers installed will be displayed.*

HOLDEN J2534 PROGRAMMING continued...

17. The SPS application will now communicate with the vehicle and request the VIN, if the VIN is incorrect update it



18. Click the **Next >** button at the bottom of the window
19. The list of programmable ECUs is displayed, select the ECU you wish to update or replace
20. Select the function, there are up to four options available:

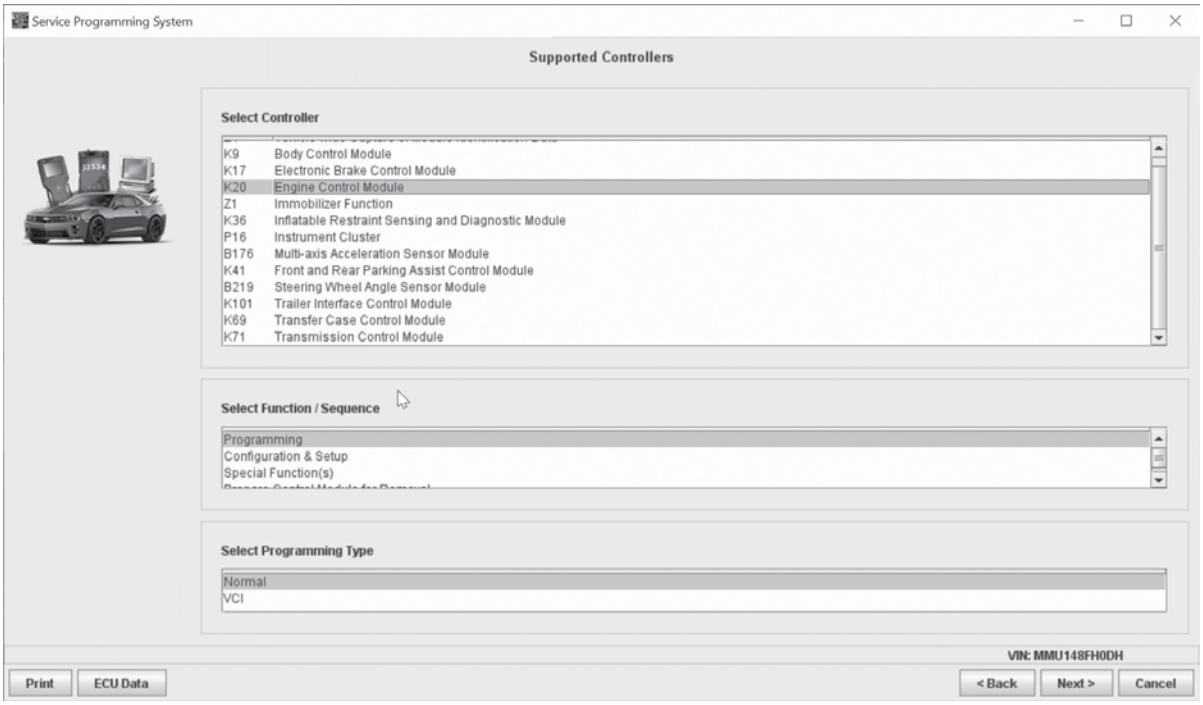
    Programming - this is the option used for software updates
    Configuration & Setup - this option is used to program a new ECU
    Special Function(s) - the author has not seen anything under this option
    Prepare Control Module for Removal - this option title is self explanatory.

21. Select the programming type, there are usually two options here:

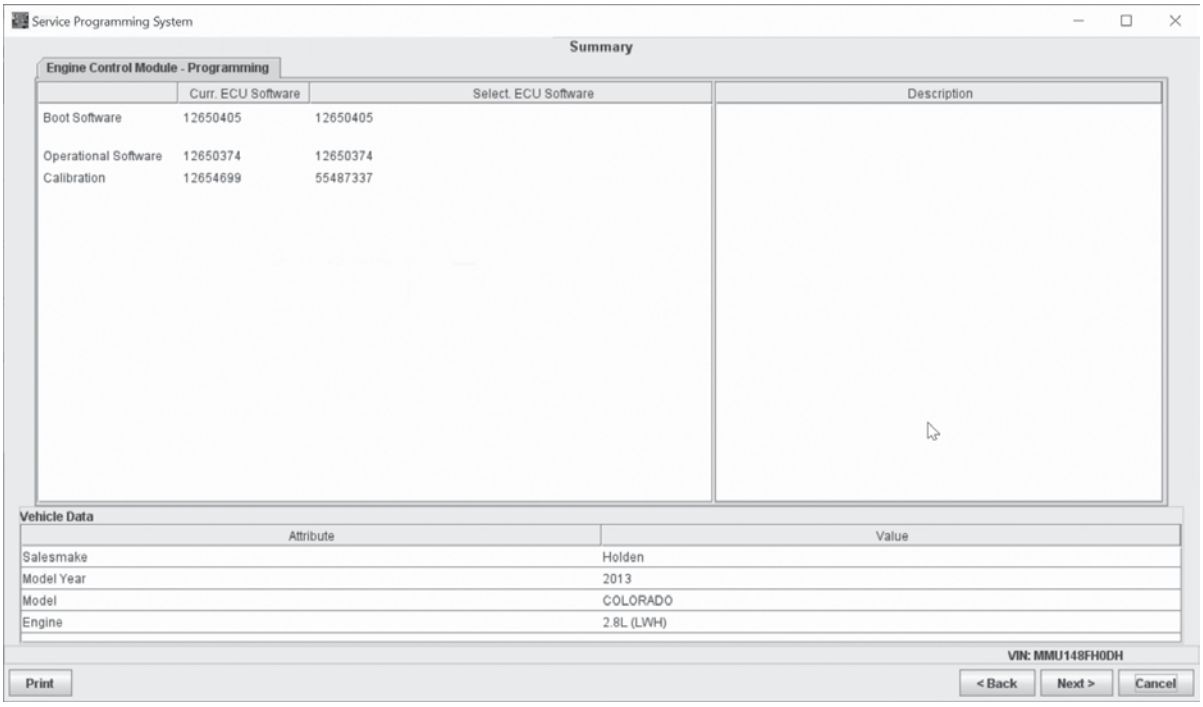
    Normal - is the typical setting
    VCI - as the author understands, this option is used predominantly by dealers for programming ECUs with the assistance of GM technical support.

Caution: *Holden (GM) only allows an ECU to be updated, it is not possible to re-write the software with the same version! If programming fails mid-process it is possible that the software number has been updated even though the file is incomplete. This means the ECU can only be programmed with the technical assistance of Holden (GM). This is where the VCI option is utilised.*

HOLDEN J2534 PROGRAMMING continued...



22. The SPS will now attempt to establish a connection with the desired ECU, once the connection is made the current ECU software version will be displayed alongside the latest ECU software version, if there is an update click **Next >**

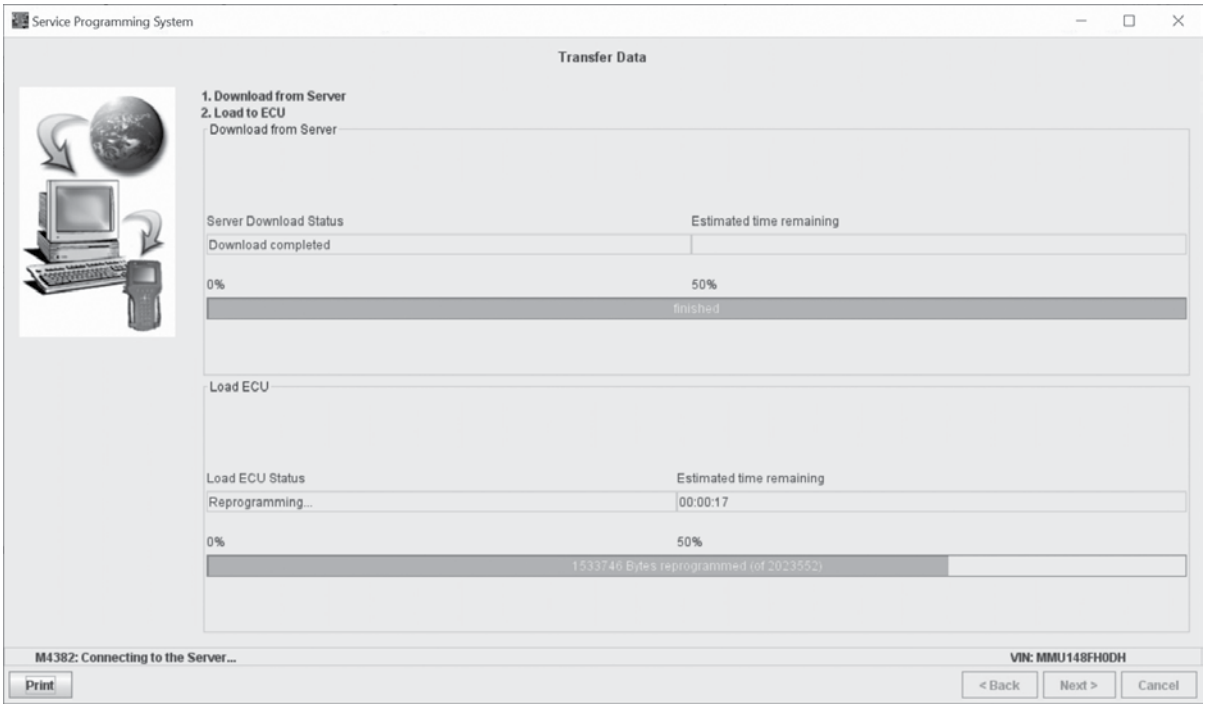


HOLDEN J2534 PROGRAMMING continued...

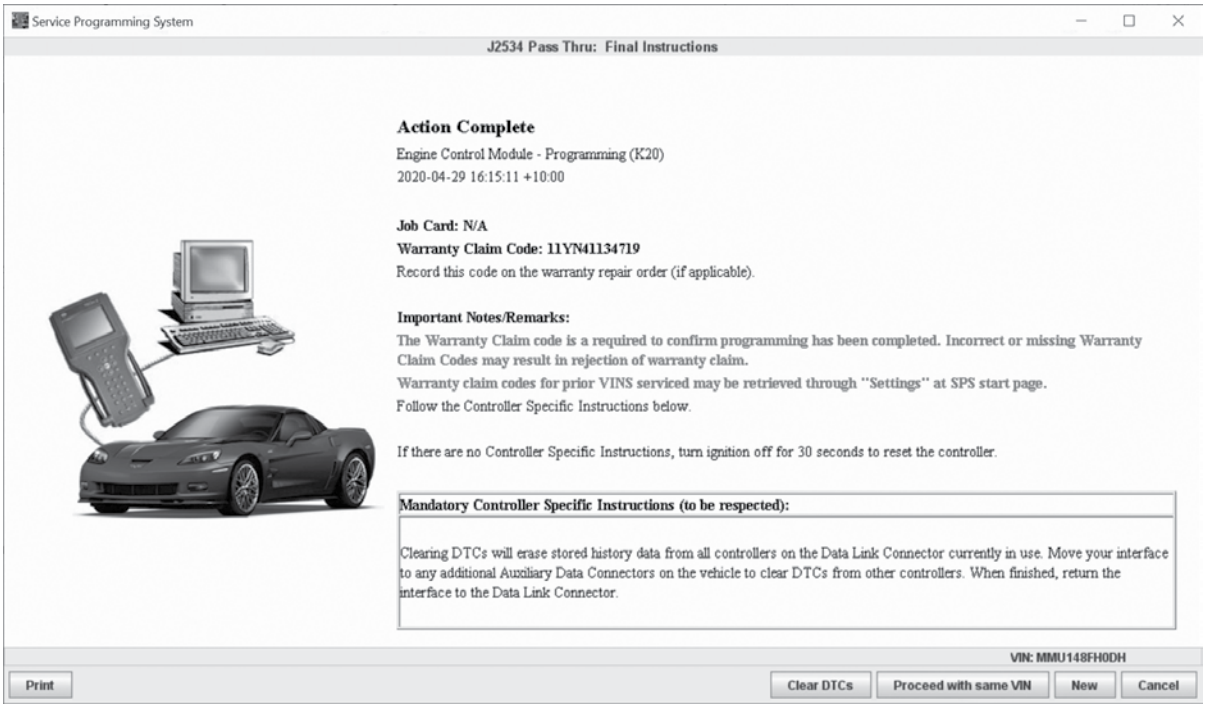
23. The data transfer now starts, this happens in two stages:

    1. Download from Server
    2. Load to ECU

    The progress bars provide an indication of where the process is at.



24. If the programming is successful the **Action Complete** ID will be displayed


Service Programming System
J2534 Pass Thru: Final Instructions
Action Complete
Engine Control Module - Programming (K20)
2020-04-29 16:15:11 +10:00
Job Card: N/A
Warranty Claim Code: 11YN41134719
Record this code on the warranty repair order (if applicable).
Important Notes/Remarks:
The Warranty Claim code is a required to confirm programming has been completed. Incorrect or missing Warranty Claim Codes may result in rejection of warranty claim.
Warranty claim codes for prior VINS serviced may be retrieved through "Settings" at SPS start page.
Follow the Controller Specific Instructions below.
If there are no Controller Specific Instructions, turn ignition off for 30 seconds to reset the controller.
Mandatory Controller Specific Instructions (to be respected):
Clearing DTCs will erase stored history data from all controllers on the Data Link Connector currently in use. Move your interface to any additional Auxiliary Data Connectors on the vehicle to clear DTCs from other controllers. When finished, return the interface to the Data Link Connector.
VIN: MMU148FH0DH
Print
Clear DTCs
Proceed with same VIN
New
Cancel

HOLDEN J2534 PROGRAMMING continued...

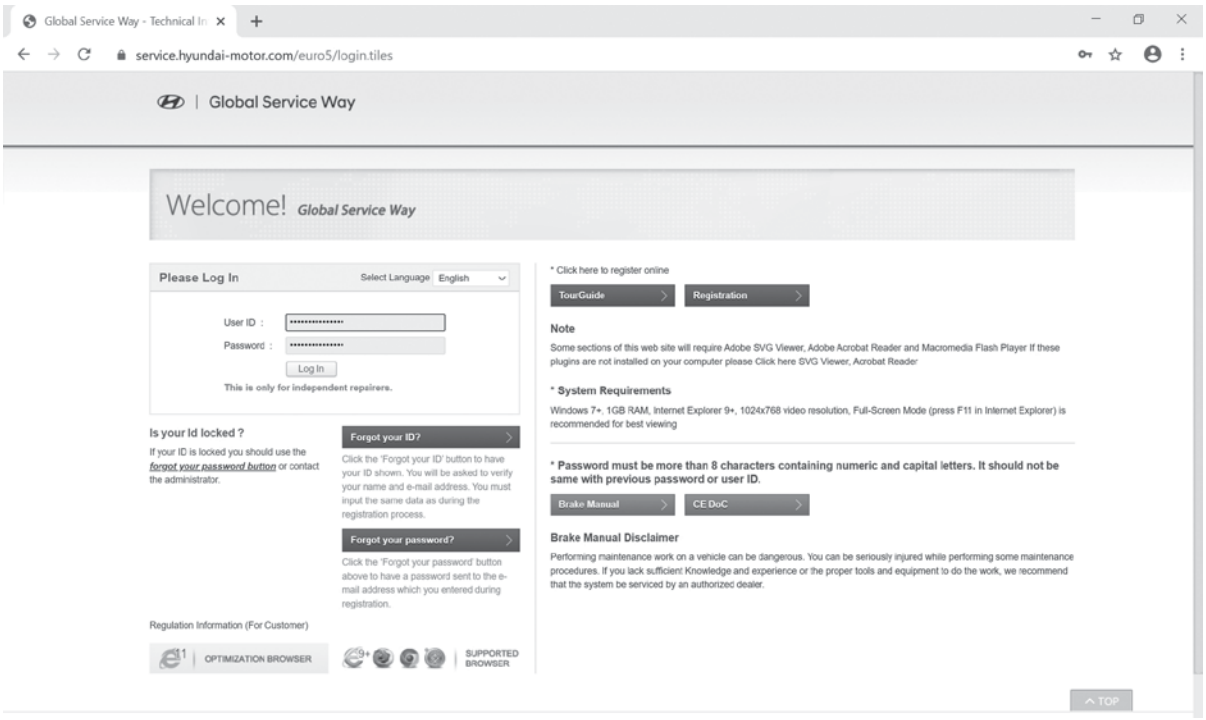
25. Follow the Final Instructions and click the Clear DTCs button. Three other options are available:

    Proceed with same VIN - this option returns the process to the list of programmable ECUs (Step 19)
    New - this option returns the process to the select tool menu (Step 9)
    Cancel - this option exits the SPS application.

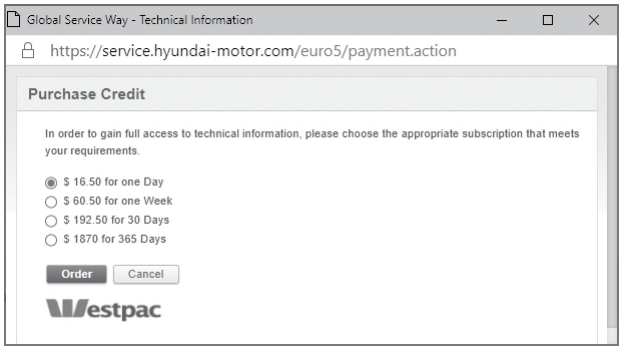
HYUNDAI J2534 PROGRAMMING

Hyundai GSW Procedure

1. Start up the PC and open a web browser
2. Access the Hyundai Global Service Way (GSW) website - https://service.hyundai-motor.com

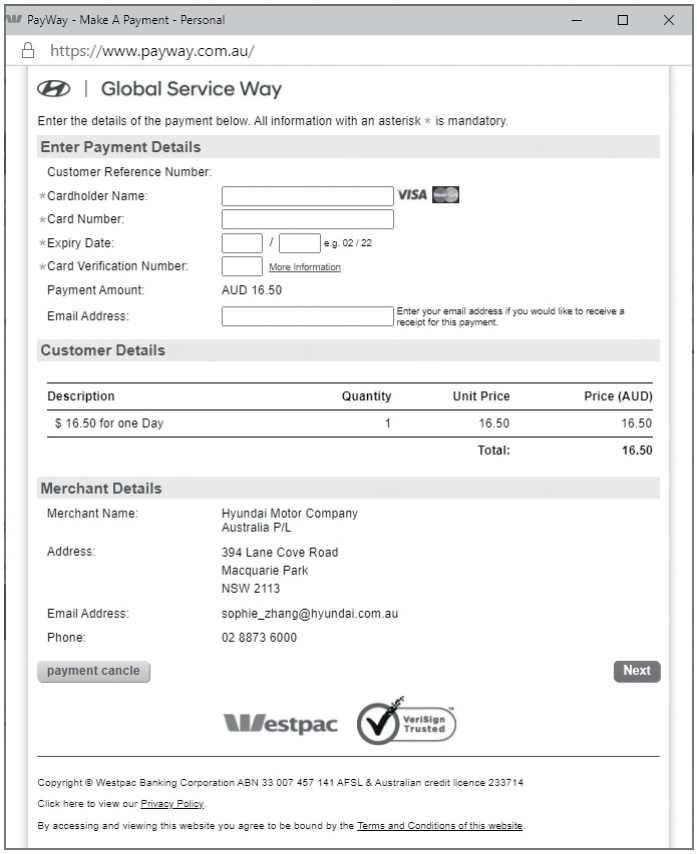

Global Service Way - Technical In
service.hyundai-motor.com/euro5/login.tiles
Global Service Way
Welcome! Global Service Way
Please Log In
Select Language English
User ID :
Password :
Log In
This is only for independent repairers.
Is your Id locked ?
If your ID is locked you should use the forgot your password button or contact the administrator.
Forgot your ID?
Click the 'Forgot your ID' button to have your ID shown. You will be asked to verify your name and e-mail address. You must input the same data as during the registration process.
Forgot your password?
Click the 'Forgot your password' button above to have a password sent to the e-mail address which you entered during registration.
Regulation Information (For Customer)
OPTIMIZATION BROWSER
SUPPORTED BROWSER
* Click here to register online
TourGuide
Registration
Note
Some sections of this web site will require Adobe SVG Viewer, Adobe Acrobat Reader and Macromedia Flash Player If these plugins are not installed on your computer please Click here SVG Viewer, Acrobat Reader
* System Requirements
Windows 7+, 1GB RAM, Internet Explorer 9+, 1024x768 video resolution, Full-Screen Mode (press F11 in Internet Explorer) is recommended for best viewing
* Password must be more than 8 characters containing numeric and capital letters. It should not be same with previous password or user ID.
Brake Manual
CE DoC
Brake Manual Disclaimer
Performing maintenance work on a vehicle can be dangerous. You can be seriously injured while performing some maintenance procedures. If you lack sufficient Knowledge and experience or the proper tools and equipment to do the work, we recommend that the system be serviced by an authorized dealer.
TOP

3. Register or Login to your account
4. If you do not have a current subscription, you will be prompted to purchase one. Choose the desired subscription and click **Order**

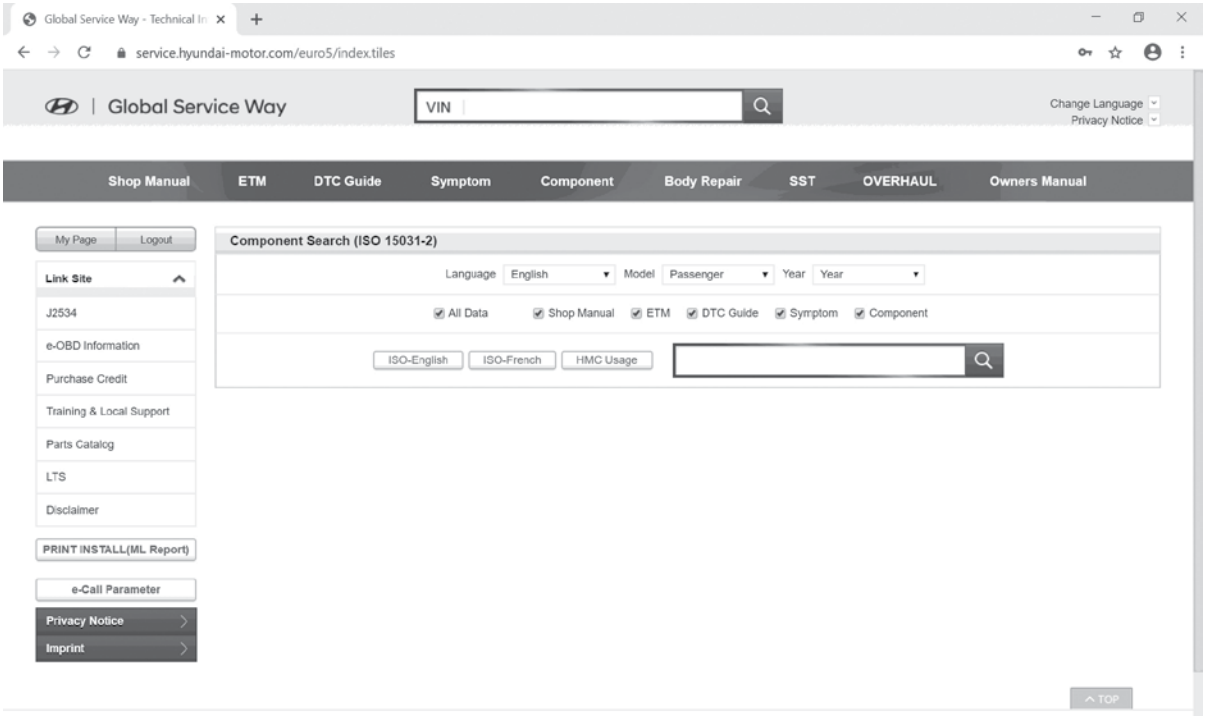

Global Service Way - Technical Information
https://service.hyundai-motor.com/euro5/payment.action
Purchase Credit
In order to gain full access to technical information, please choose the appropriate subscription that meets your requirements.
$ 16.50 for one Day
$ 60.50 for one Week
$ 192.50 for 30 Days
$ 1870 for 365 Days
Order
Cancel
Westpac

HYUNDAI J2534 PROGRAMMING continued...

5. Complete the payment procedure and click **Next**

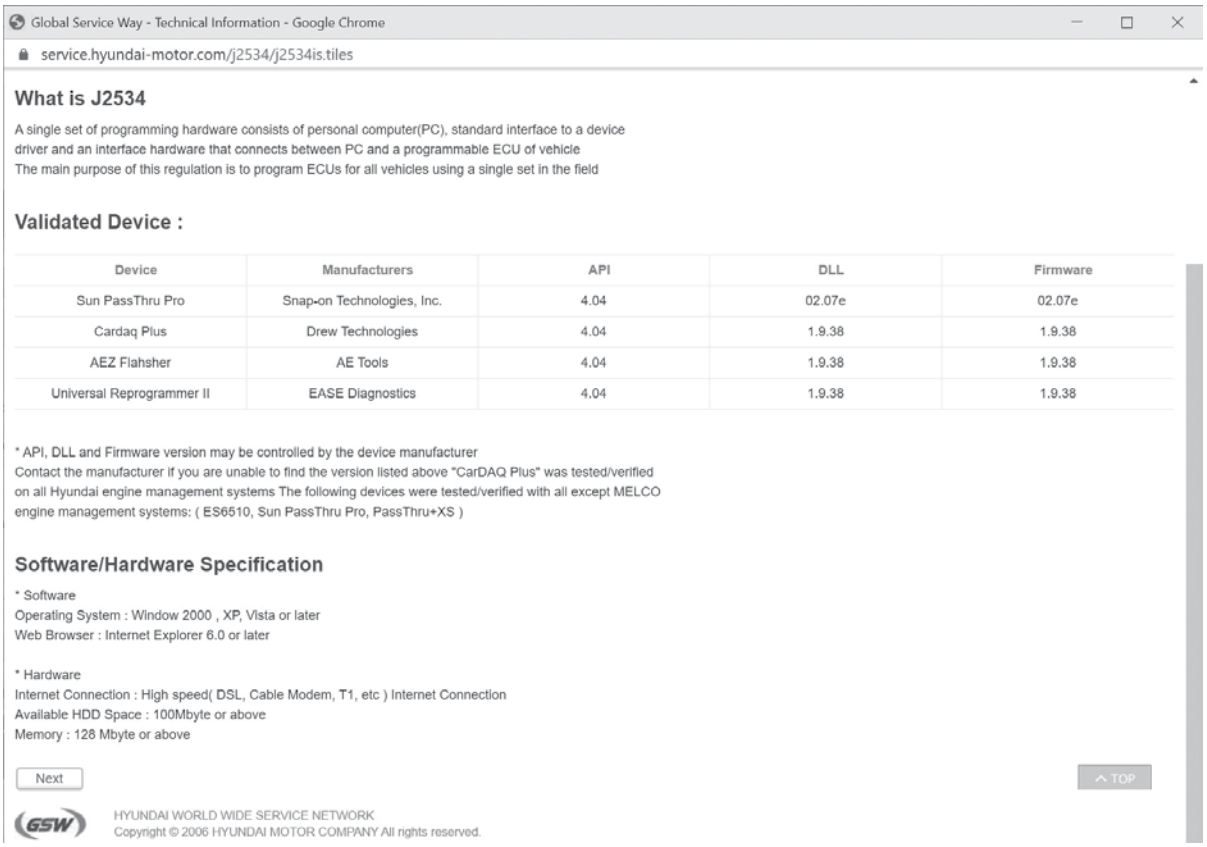


6. Click on the **J2534** link in the left side menu



HYUNDAI J2534 PROGRAMMING continued...

7. This will link to the J2534 Programming Area, a list of Validated [J2534 Pass-thru] Devices is displayed as well as a list of the required PC Specifications. If all requirements are met, click the **Next** button


Global Service Way - Technical Information - Google Chrome
service.hyundai-motor.com/j2534/j2534is.tiles
What is J2534
A single set of programming hardware consists of personal computer(PC), standard interface to a device driver and an interface hardware that connects between PC and a programmable ECU of vehicle
The main purpose of this regulation is to program ECUs for all vehicles using a single set in the field
Validated Device :
Device | Manufacturers | API | DLL | Firmware
Sun PassThru Pro | Snap-on Technologies, Inc. | 4.04 | 02.07e | 02.07e
Cardaq Plus | Drew Technologies | 4.04 | 1.9.38 | 1.9.38
AEZ Flahsher | AE Tools | 4.04 | 1.9.38 | 1.9.38
Universal Reprogrammer II | EASE Diagnostics | 4.04 | 1.9.38 | 1.9.38
* API, DLL and Firmware version may be controlled by the device manufacturer
Contact the manufacturer if you are unable to find the version listed above "CarDAQ Plus" was tested/verified on all Hyundai engine management systems The following devices were tested/verified with all except MELCO engine management systems: (ES6510, Sun PassThru Pro, PassThru+XS)
Software/Hardware Specification
* Software
Operating System : Window 2000 , XP, Vista or later
Web Browser : Internet Explorer 6.0 or later
* Hardware
Internet Connection : High speed(DSL, Cable Modem, T1, etc) Internet Connection
Available HDD Space : 100Mbyte or above
Memory : 128 Mbyte or above
Next
TOP
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The four tools that are validated by Hyundai are all the Drew Technologies Cardaq Plus 3, it is just that they have been re-branded by the other companies.

Snap-on, Sun PassThru Pro

Drew Technologies, CarDAQ Plus3

AE Tools, AEZ Flasher

EASE Diagnostics, Universal Reprogrammer II+

HYUNDAI J2534 PROGRAMMING continued...

8. Ignore the **NOTE** and the **CAUTION** for the time being, these will be addressed in a few steps time.

   You may need to install the latest Hyundai J2534 Application, if so click **Download**

Global Service Way - Technical Information - Google Chrome
service.hyundai-motor.com/j2534/info.tiles
Global Service Way
Welcome to Hyundai J2534!
Programming Area
NOTE
Some vehicles need an additional power supply.
Click here for detail
CAUTION
During the ECU reprogram, observe the following precautions.
Failure to follow these precautions may result in ECU damage.
1) DO NOT run any other programs other than the J2534 application.
2) DO NOT disturb or disconnect the DLC cable or interface cable.
3) DO NOT turn the device OFF.
4) DO NOT turn the ignition key to the OFF position.
5) DO NOT start the engine.
6) DO NOT operate any electrical accessories. (climate control, lighting, audio, etc.)
* Program Details
- File Name: J2534HmeSetup.exe
- Version: 2.01.00
- Date Published: 10/02/2018
- Language: English
- Download Size: 10.9 MB
* Downloading J2534 Application
1. Click "Run" in the two installer windows that follow
Run
Run
2. Then, just follow the installer's simple instructions
Download
TOP
HYUNDAI WORLD WIDE SERVICE NETWORK
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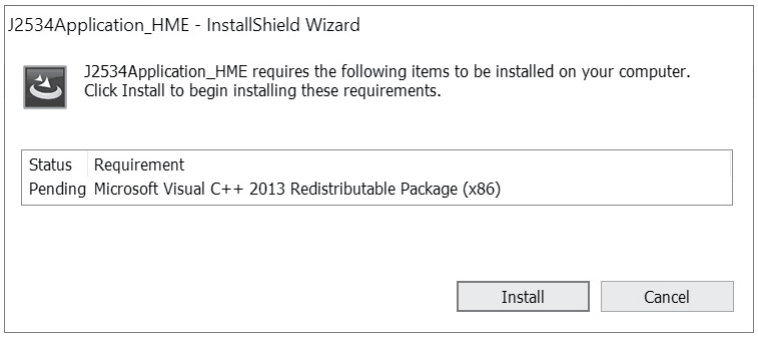
HYUNDAI J2534 PROGRAMMING continued...

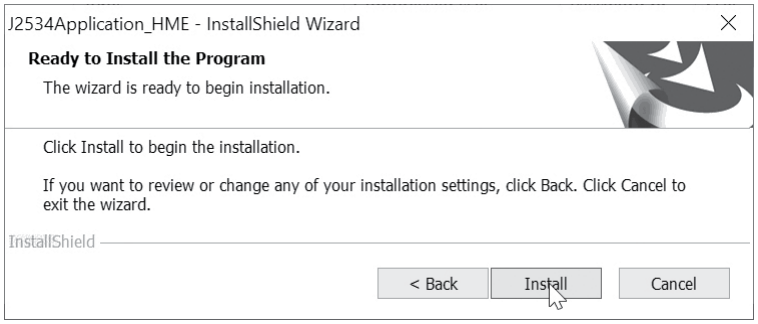
9. You may need to give a variety of approvals:

User Account Control
Do you want to allow this app to make changes to your device?
J2534Application_HME
Verified publisher: GIT Co,.ltd.
File origin: Downloaded from the Internet
Show more details
Yes
No

Click, ***Yes***


J2534Application_HME - InstallShield Wizard
J2534Application_HME requires the following items to be installed on your computer.
Click Install to begin installing these requirements.
Status Requirement
Pending Microsoft Visual C++ 2013 Redistributable Package (x86)
Install
Cancel

Click, ***Install***

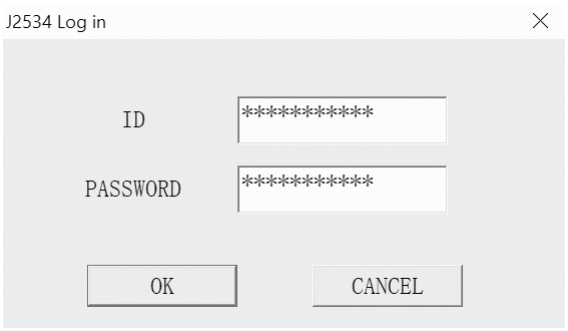

J2534Application_HME - InstallShield Wizard
Ready to Install the Program
The wizard is ready to begin installation.
Click Install to begin the installation.
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.
InstallShield
< Back
Install
Cancel

Click, ***Install***

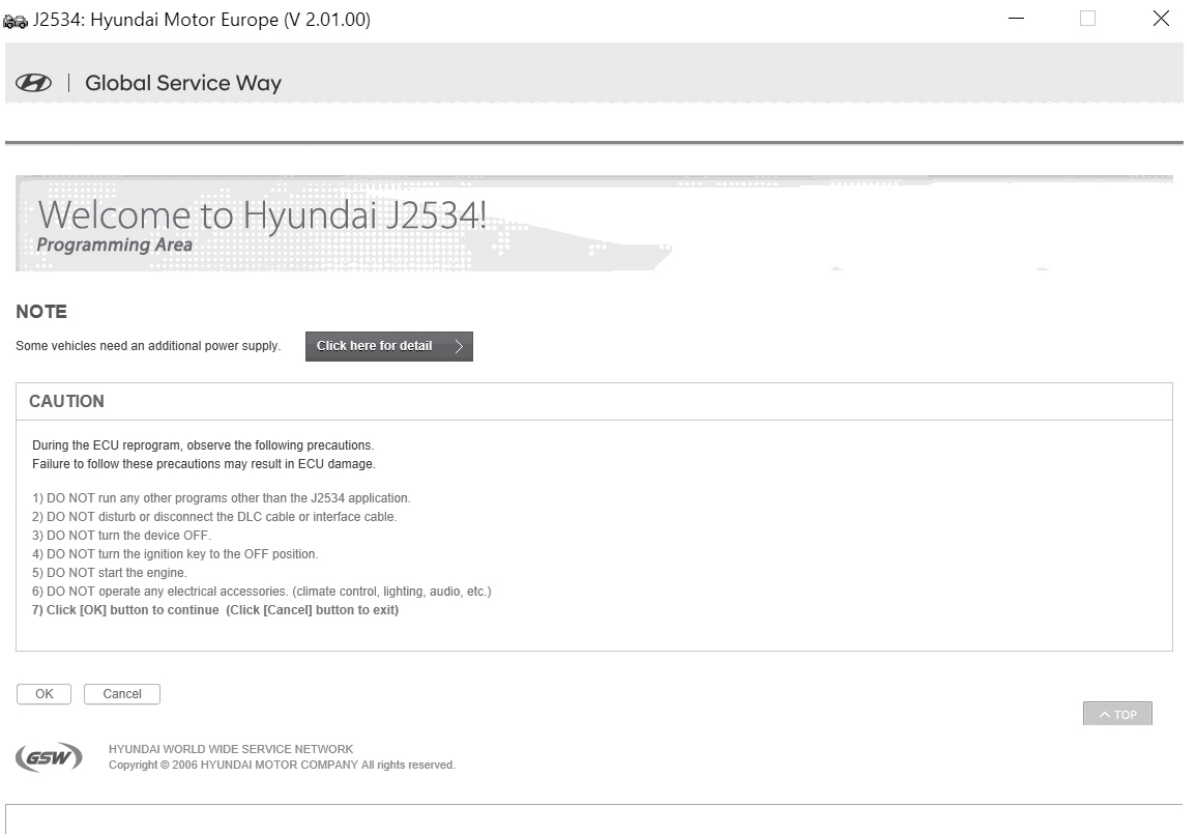
10. Once installed the **J2534_HME** icon should appear on the desktop

HYUNDAI J2534 PROGRAMMING continued...

11. Close all programs and web-browsers and double-click the **J2534_HME** icon
12. You will now need to log into your Hyundai - Global Service Way (GSW) account and have an active subscription



13. The Hyundai Motor Europe (HME) J2534 application will open, it looks very similar to the pages seen during the install process but the critical difference is that this is the HME application which can be identified by the application name and version number in the top banner of the window.


J2534: Hyundai Motor Europe (V 2.01.00)
Global Service Way
Welcome to Hyundai J2534!
Programming Area
NOTE
Some vehicles need an additional power supply.
Click here for detail
CAUTION
During the ECU reprogram, observe the following precautions.
Failure to follow these precautions may result in ECU damage.
1) DO NOT run any other programs other than the J2534 application.
2) DO NOT disturb or disconnect the DLC cable or interface cable.
3) DO NOT turn the device OFF.
4) DO NOT turn the ignition key to the OFF position.
5) DO NOT start the engine.
6) DO NOT operate any electrical accessories. (climate control, lighting, audio, etc.)
7) Click [OK] button to continue (Click [Cancel] button to exit)
OK
Cancel
TOP
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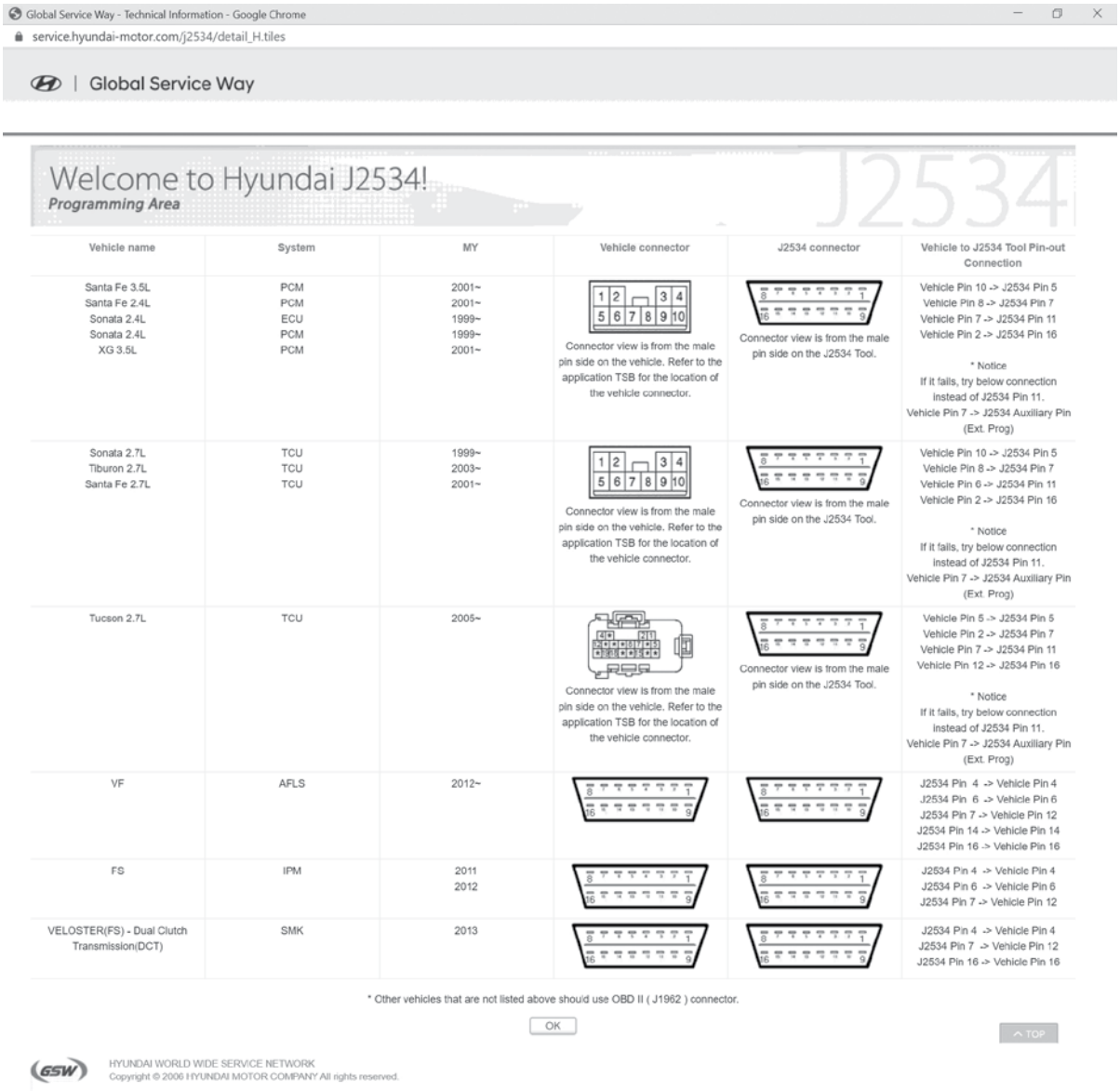
14. Read the **NOTE** and select **Click here for detail >**

HYUNDAI J2534 PROGRAMMING continued...

15. A list of vehicles that have special power supply requirements in order to carry out programming is provided. While it is mainly for pre-2005 (pre-euro5) vehicles there are a couple of later vehicles that have specific requirements for specific modules:

    i40 (VF) - Adaptive Front Lighting System (AFLS) - 2012-
    VELOSTAR (FS) - Intelligent integrated Platform Module (IPM) 2011-2012
    VELOSTAR (FS) - Dual Clutch Trans (DCT) - Smart Key Unit (SMK) 2013


Global Service Way - Technical Information - Google Chrome

service.hyundai-motor.com/j2534/detail_H.tiles

Global Service Way

Welcome to Hyundai J2534!

Programming Area

Vehicle name	System	MY	Vehicle connector	J2534 connector	Vehicle to J2534 Tool Pin-out Connection
Santa Fe 3.5L Santa Fe 2.4L Sonata 2.4L Sonata 2.4L XG 3.5L	PCM PCM ECU PCM PCM	2001~ 2001~ 1999~ 1999~ 2001~	Connector view is from the male pin side on the vehicle. Refer to the application TSB for the location of the vehicle connector.	Connector view is from the male pin side on the J2534 Tool.	Vehicle Pin 10 -> J2534 Pin 5 Vehicle Pin 8 -> J2534 Pin 7 Vehicle Pin 7 -> J2534 Pin 11 Vehicle Pin 2 -> J2534 Pin 16 * Notice If it fails, try below connection instead of J2534 Pin 11. Vehicle Pin 7 -> J2534 Auxiliary Pin (Ext. Prog)
Sonata 2.7L Tiburon 2.7L Santa Fe 2.7L	TCU TCU TCU	1999~ 2003~ 2001~	Connector view is from the male pin side on the vehicle. Refer to the application TSB for the location of the vehicle connector.	Connector view is from the male pin side on the J2534 Tool.	Vehicle Pin 10 -> J2534 Pin 5 Vehicle Pin 8 -> J2534 Pin 7 Vehicle Pin 6 -> J2534 Pin 11 Vehicle Pin 2 -> J2534 Pin 16 * Notice If it fails, try below connection instead of J2534 Pin 11. Vehicle Pin 7 -> J2534 Auxiliary Pin (Ext. Prog)
Tucson 2.7L	TCU	2005~	Connector view is from the male pin side on the vehicle. Refer to the application TSB for the location of the vehicle connector.	Connector view is from the male pin side on the J2534 Tool.	Vehicle Pin 5 -> J2534 Pin 5 Vehicle Pin 2 -> J2534 Pin 7 Vehicle Pin 7 -> J2534 Pin 11 Vehicle Pin 12 -> J2534 Pin 16 * Notice If it fails, try below connection instead of J2534 Pin 11. Vehicle Pin 7 -> J2534 Auxiliary Pin (Ext. Prog)
VF	AFLS	2012~			J2534 Pin 4 -> Vehicle Pin 4 J2534 Pin 6 -> Vehicle Pin 6 J2534 Pin 7 -> Vehicle Pin 12 J2534 Pin 14 -> Vehicle Pin 14 J2534 Pin 16 -> Vehicle Pin 16
FS	IPM	2011 2012			J2534 Pin 4 -> Vehicle Pin 4 J2534 Pin 6 -> Vehicle Pin 6 J2534 Pin 7 -> Vehicle Pin 12
VELOSTER(FS) - Dual Clutch Transmission(DCT)	SMK	2013			J2534 Pin 4 -> Vehicle Pin 4 J2534 Pin 7 -> Vehicle Pin 12 J2534 Pin 16 -> Vehicle Pin 16

* Other vehicles that are not listed above should use OBD II (J1962) connector.

OK

TOP

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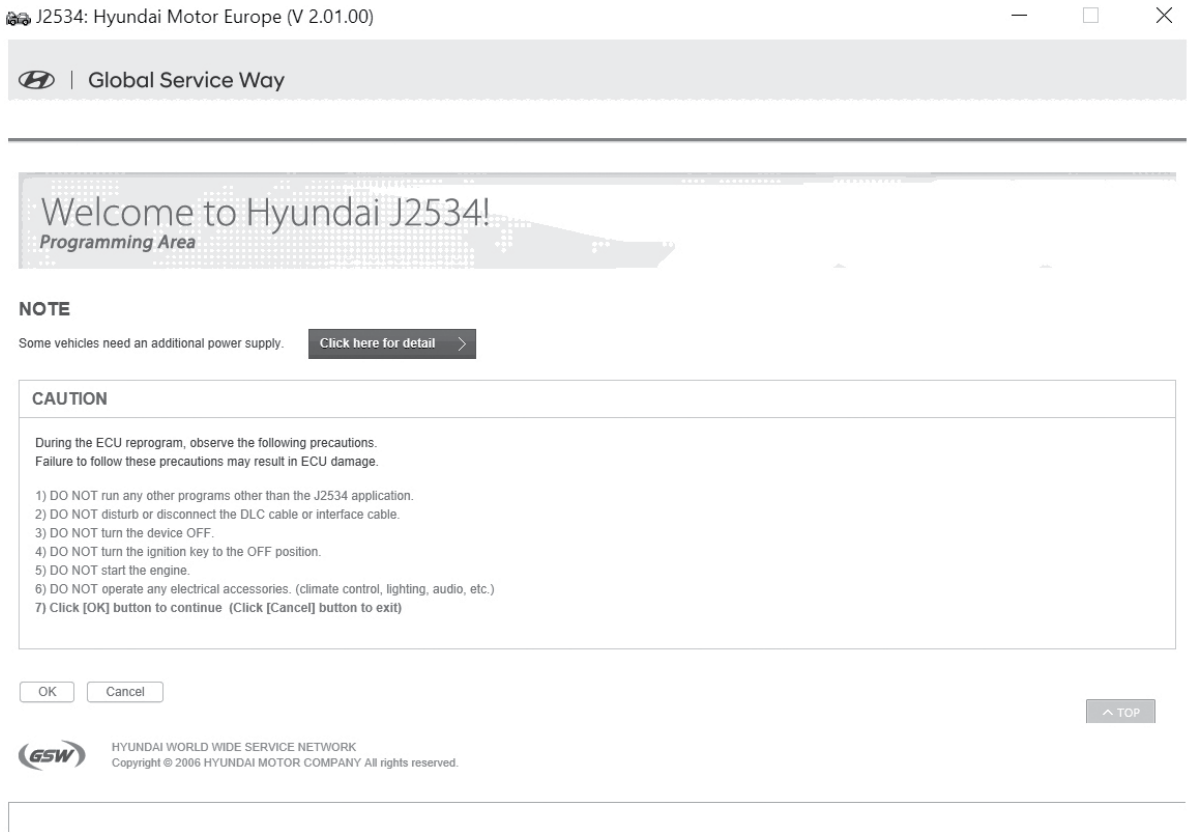
Caution: *This list may vary over time, it should be checked before EVERY programming event!*

HYUNDAI J2534 PROGRAMMING continued...

Caution: *Auto-Tech recommends using a Voltage Stabiliser to prevent low voltage failures during programming that may result in damage to the ECUs. Some but not all manufacturers require the use of a Voltage Stabiliser!*

16. Once any special power supply requirements have been checked and followed, check the list of cautions provided. Click the **OK** button to continue


J2534: Hyundai Motor Europe (V 2.01.00)
Global Service Way
Welcome to Hyundai J2534!
Programming Area
NOTE
Some vehicles need an additional power supply.
Click here for detail
CAUTION
During the ECU reprogram, observe the following precautions.
Failure to follow these precautions may result in ECU damage.
1) DO NOT run any other programs other than the J2534 application.
2) DO NOT disturb or disconnect the DLC cable or interface cable.
3) DO NOT turn the device OFF.
4) DO NOT turn the ignition key to the OFF position.
5) DO NOT start the engine.
6) DO NOT operate any electrical accessories. (climate control, lighting, audio, etc.)
7) Click [OK] button to continue (Click [Cancel] button to exit)
OK
Cancel
TOP
HYUNDAI WORLD WIDE SERVICE NETWORK
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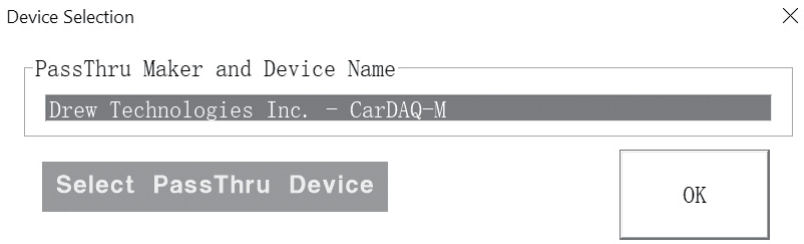
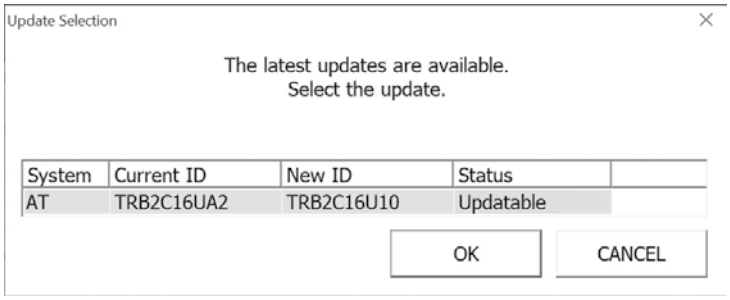
17. Select the J2534 Device from the menu provided and click the **OK** button



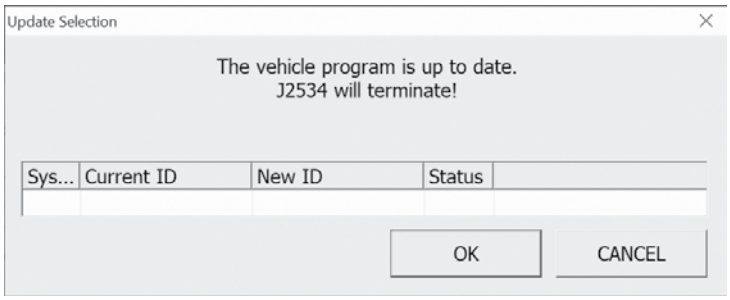
Note: *The author did not have an validated device at the time. The HME software allowed the use of the older CarDAQ-M, but as this device is not validated if an error had occurred Hyundai would most likely not offer technical support!*

HYUNDAI J2534 PROGRAMMING continued...

18. A window displaying available updates (if any) is displayed, select the desired update and click the **OK** button

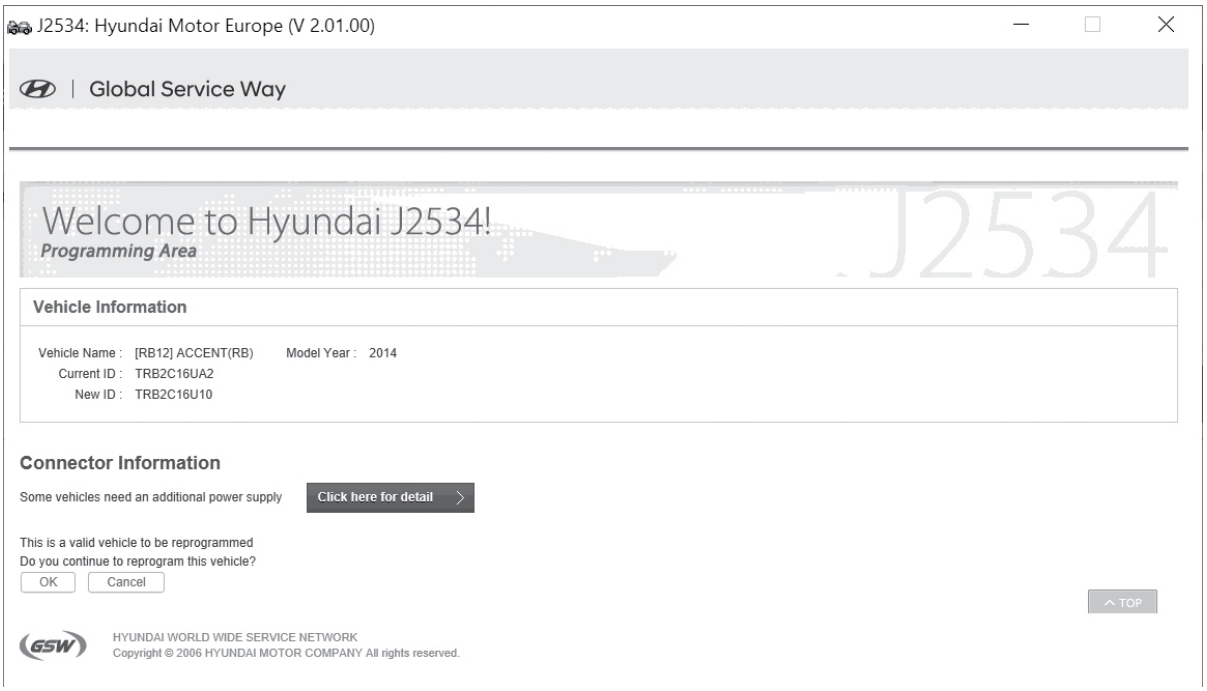


This example shows one update for the Transmission ECU



This example shows a vehicle that is up-to-date

19. The software now returns to the main application, Check the **Vehicle Information** along with the **Current** [software] **ID** and **New** [software] **ID**. If the vehicle details are correct continue to the next step


J2534: Hyundai Motor Europe (V 2.01.00)
Global Service Way
Welcome to Hyundai J2534!
Programming Area
J2534
Vehicle Information
Vehicle Name : [RB12] ACCENT(RB)
Model Year : 2014
Current ID : TRB2C16UA2
New ID : TRB2C16U10
Connector Information
Some vehicles need an additional power supply
Click here for detail
This is a valid vehicle to be reprogrammed
Do you continue to reprogram this vehicle?
OK
Cancel
TOP
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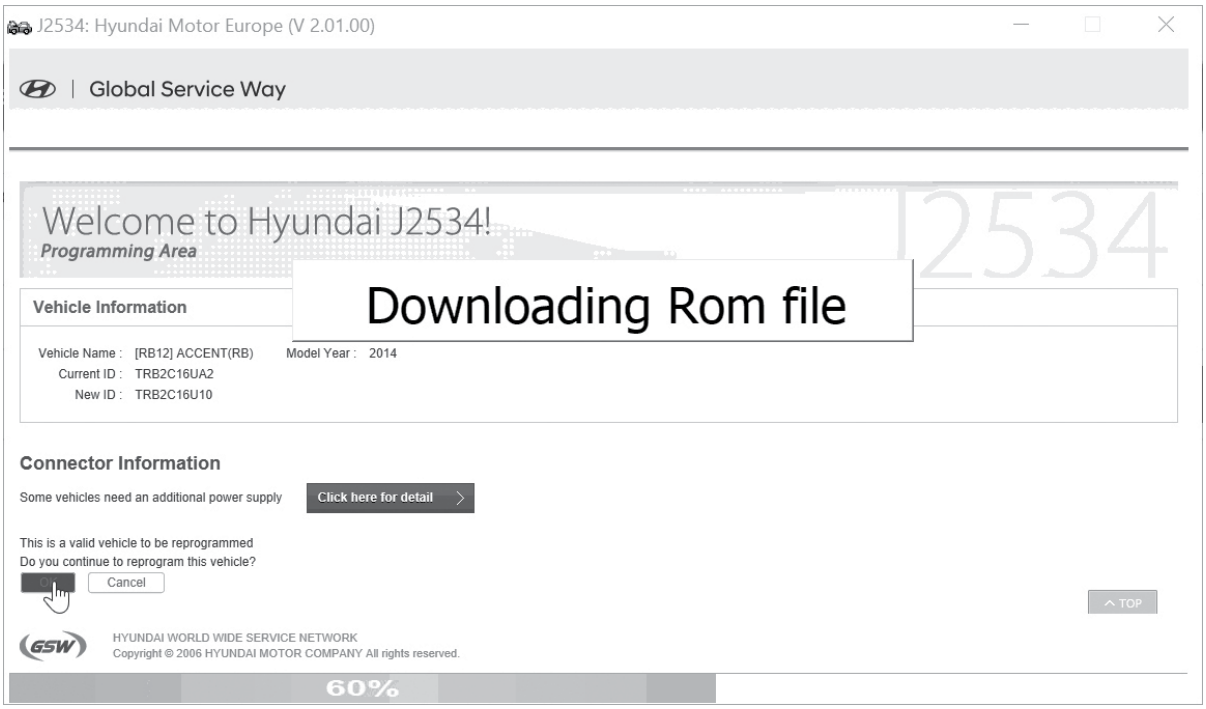
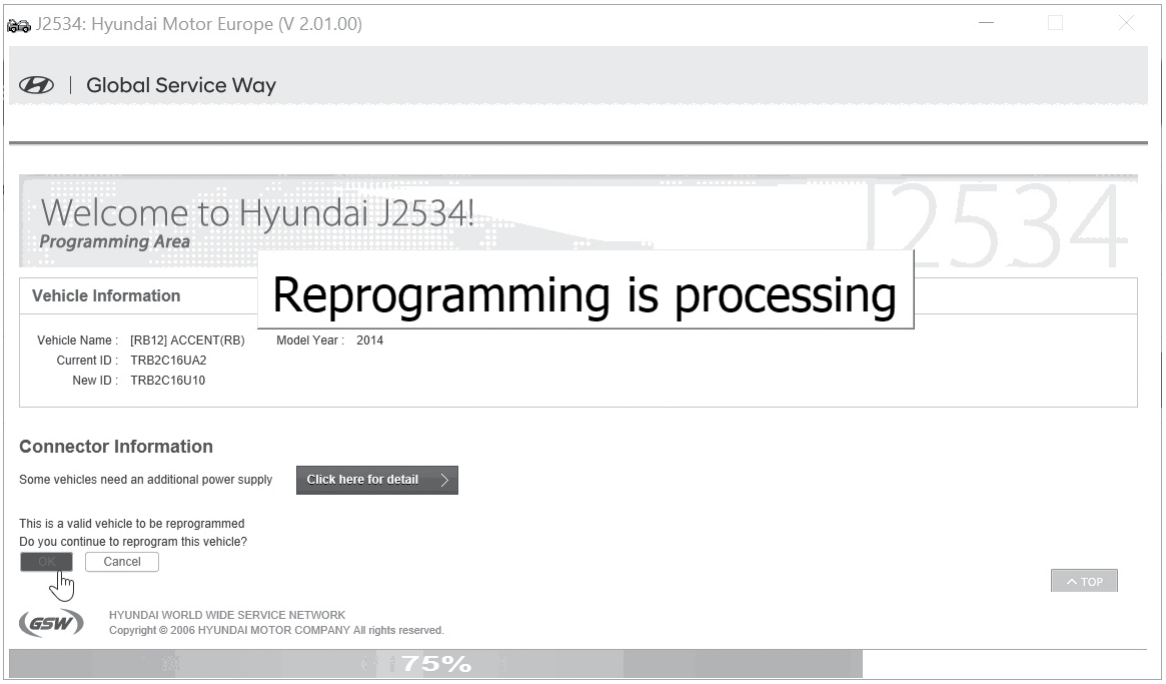
20. Next is a **Connector Information** and a link. This is the same table of vehicles and connectors that was checked in step 15.

HYUNDAI J2534 PROGRAMMING continued...

21. To reprogram the vehicle click the **OK** button
22. The ROM file will start downloading to the PC and the progress is shown on the status bar at the bottom of the window

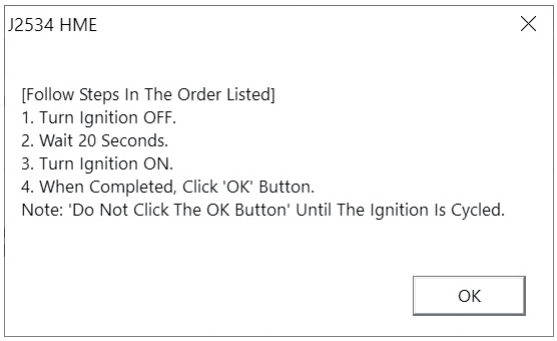


23. Once downloaded the file will automatically be written to the vehicles ECU, once again the progress is shown on the status bar at the bottom of the window

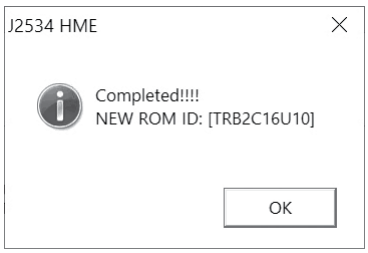


HYUNDAI J2534 PROGRAMMING continued...

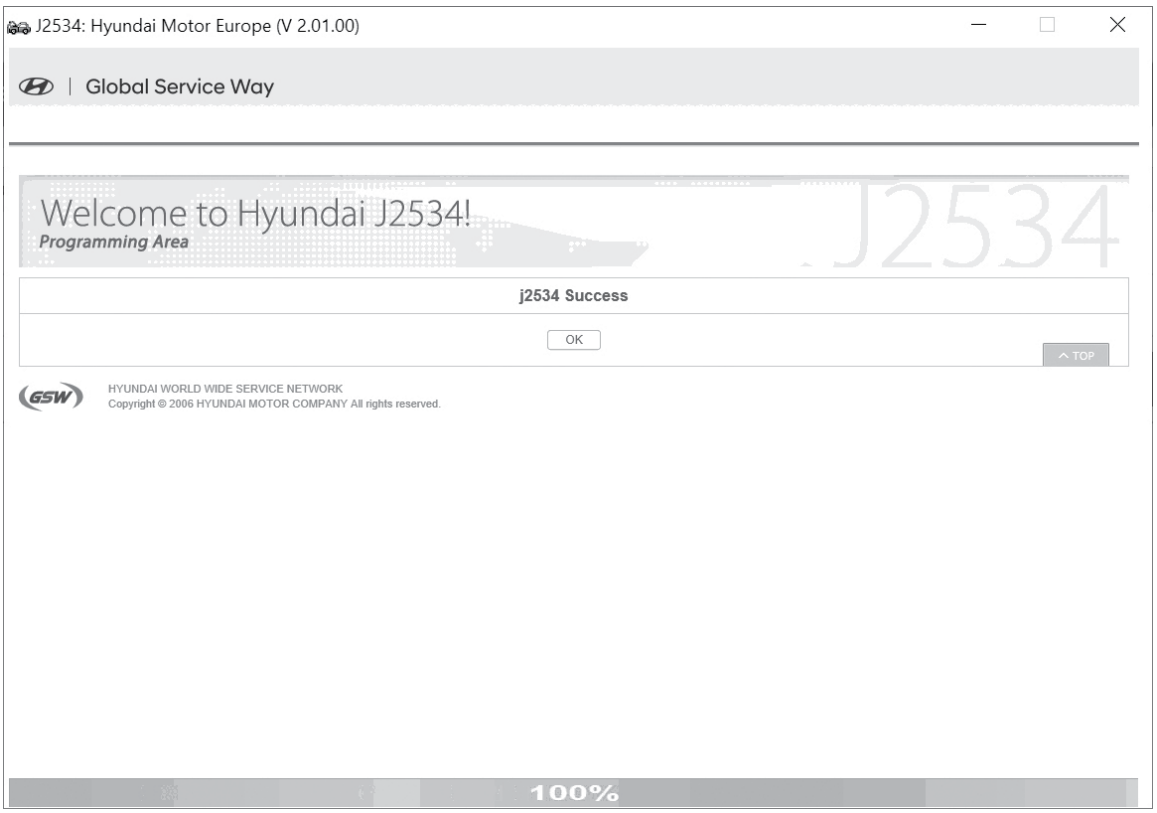
24. Once the file has been written to the vehicles ECU a final set of instructions are provided to complete the process. Follow the procedure and click the **OK** button


J2534 HME
[Follow Steps In The Order Listed]
1. Turn Ignition OFF.
2. Wait 20 Seconds.
3. Turn Ignition ON.
4. When Completed, Click 'OK' Button.
Note: 'Do Not Click The OK Button' Until The Ignition Is Cycled.
OK

25. A verification message is displayed, click the **OK** button



26. Finally the **J2534 Success** screen identifies the end of the programming, clicking the **OK** button closes the HME J2534 application.



HYUNDAI J2534 PROGRAMMING continued...

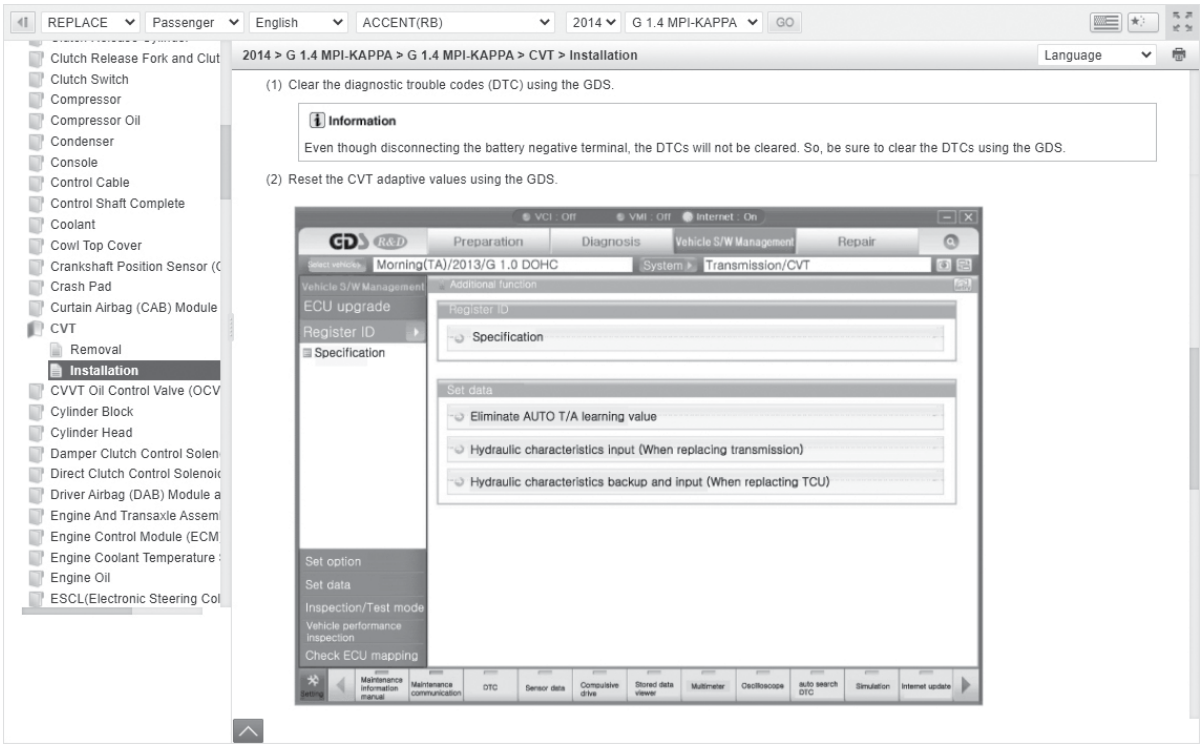
Note: *While there is no mention in the factory procedure, the Drew Technologies J2534 Toolbox application states that a CVT re-learn should be completed after updating the transmission software!*

27. Access the Hyundai GSW (Global Service Way), Technical Information website

    Input the **VIN** and click **search** icon

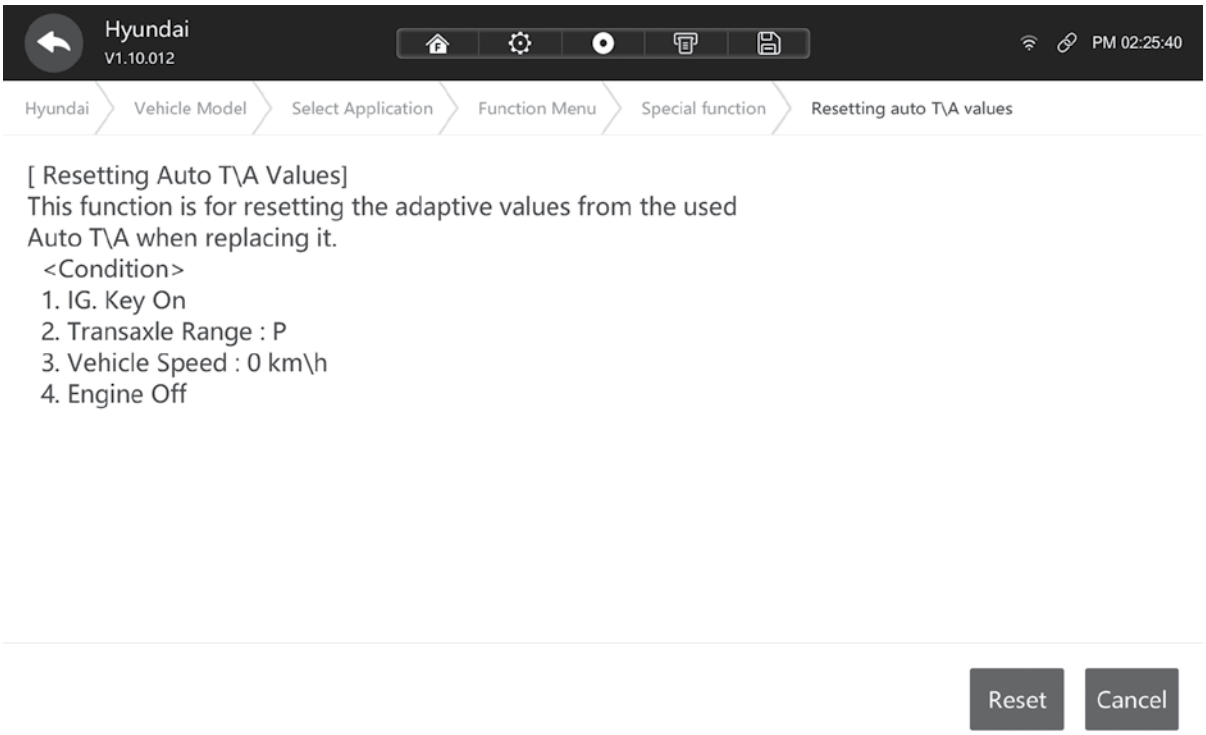
    Select the vehicle details and click **GO**

28. From the main menu select **CVT**, then **Installation**

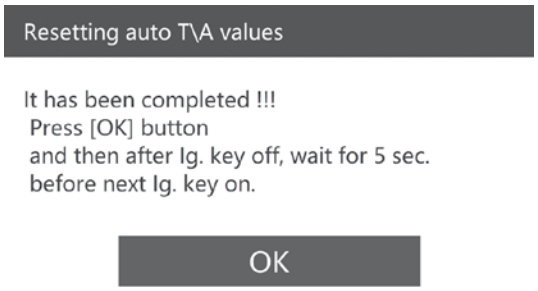


HYUNDAI J2534 PROGRAMMING continued...

29. With the J2534 Pass Thru device disconnected from the vehicle. Connect a compatible Scan Tool, clear all DTCs and carry out the CVT re-learn procedure. Ensure all parameters are met and click the **Reset** button

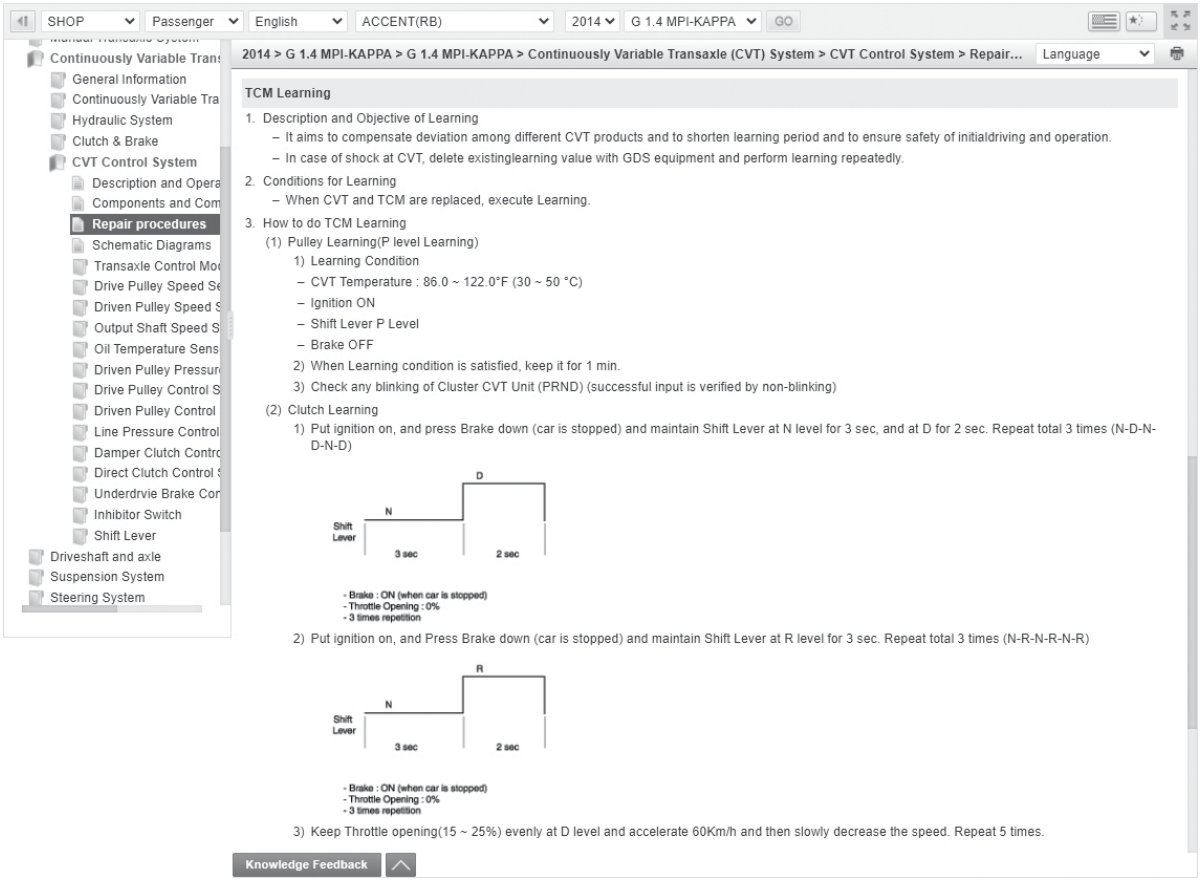


30. Follow the Scan Tool directions to complete the reset


Resetting auto T\A values
It has been completed !!!
Press [OK] button
and then after Ig. key off, wait for 5 sec.
before next Ig. key on.
OK

HYUNDAI J2534 PROGRAMMING continued...

31. After the Scan Tool reset is complete, the relearning procedure is required, On the GSW tech info website, from the main menu select **Continuously Variable Transmission**, then **CVT Control System** and then **Repair Procedure**


SHOP
Passenger
English
ACCENT(RB)
2014
G 1.4 MPI-KAPPA
GO
Continuously Variable Trans
General Information
Continuously Variable Tra
Hydraulic System
Clutch & Brake
CVT Control System
Description and Opera
Components and Com
Repair procedures
Schematic Diagrams
Transaxle Control Mo
Drive Pulley Speed Se
Driven Pulley Speed S
Output Shaft Speed S
Oil Temperature Sens
Driven Pulley Pressur
Drive Pulley Control S
Driven Pulley Control
Line Pressure Control
Damper Clutch Contro
Direct Clutch Control S
Underdrvie Brake Cor
Inhibitor Switch
Shift Lever
Driveshaft and axle
Suspension System
Steering System
2014 > G 1.4 MPI-KAPPA > G 1.4 MPI-KAPPA > Continuously Variable Transaxle (CVT) System > CVT Control System > Repair...
Language
TCM Learning
1. Description and Objective of Learning
– It aims to compensate deviation among different CVT products and to shorten learning period and to ensure safety of initialdriving and operation.
– In case of shock at CVT, delete existinglearning value with GDS equipment and perform learning repeatedly.
2. Conditions for Learning
– When CVT and TCM are replaced, execute Learning.
3. How to do TCM Learning
(1) Pulley Learning(P level Learning)
1) Learning Condition
– CVT Temperature : 86.0 ~ 122.0°F (30 ~ 50 °C)
– Ignition ON
– Shift Lever P Level
– Brake OFF
2) When Learning condition is satisfied, keep it for 1 min.
3) Check any blinking of Cluster CVT Unit (PRND) (successful input is verified by non-blinking)
(2) Clutch Learning
1) Put ignition on, and press Brake down (car is stopped) and maintain Shift Lever at N level for 3 sec, and at D for 2 sec. Repeat total 3 times (N-D-N-D-N-D)
D
N
Shift Lever
3 sec
2 sec
- Brake : ON (when car is stopped)
- Throttle Opening : 0%
- 3 times repetition
2) Put ignition on, and Press Brake down (car is stopped) and maintain Shift Lever at R level for 3 sec. Repeat total 3 times (N-R-N-R-N-R)
R
N
Shift Lever
3 sec
2 sec
- Brake : ON (when car is stopped)
- Throttle Opening : 0%
- 3 times repetition
3) Keep Throttle opening(15 ~ 25%) evenly at D level and accelerate 60Km/h and then slowly decrease the speed. Repeat 5 times.
Knowledge Feedback

32. The full software updating and relearning procedures are now completed.

KIA J2534 PROGRAMMING

Kia GSW Procedure

The Kia Global Service Way is almost identical to the Hyundai system. The actual procedure for software updates can be done following what has been previously set out for the Hyundai with the following changes.

Note: *In Australia the J2534 application is found on the Australian portal and the fees are charged in Australian Dollars. However, in the production of this training clinic J2534 programming was unsuccessfully attempted on 7 different vehicles. Therefore Auto-Tech cannot be sure that any vehicles are currently being supported in here.*

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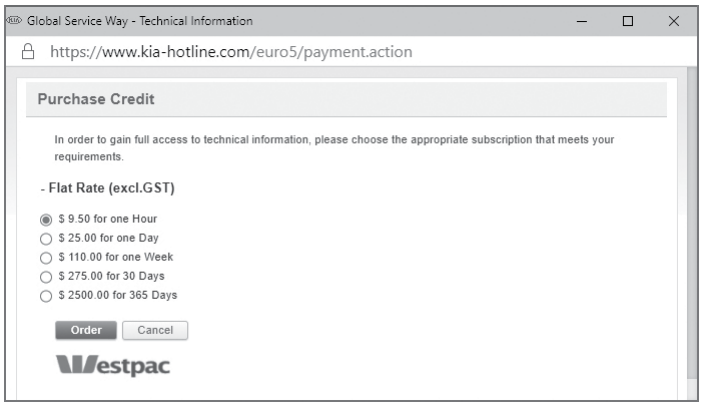
Kia Motor Europe (KME) J2534 Application

Kia have their own application, the icon is the same as Hyundai but the file is different. You will need to install the J2534_KME application

Access Cost

Kia have a slightly different pricing structure


Global Service Way - Technical Information
https://www.kia-hotline.com/euro5/payment.action
Purchase Credit
In order to gain full access to technical information, please choose the appropriate subscription that meets your requirements.
- Flat Rate (excl.GST)
$ 9.50 for one Hour
$ 25.00 for one Day
$ 110.00 for one Week
$ 275.00 for 30 Days
$ 2500.00 for 365 Days
Order
Cancel
Westpac

Caution: *The author has encountered multiple programming failures due to the 1 hour subscription expiring before the procedure can be completed.*

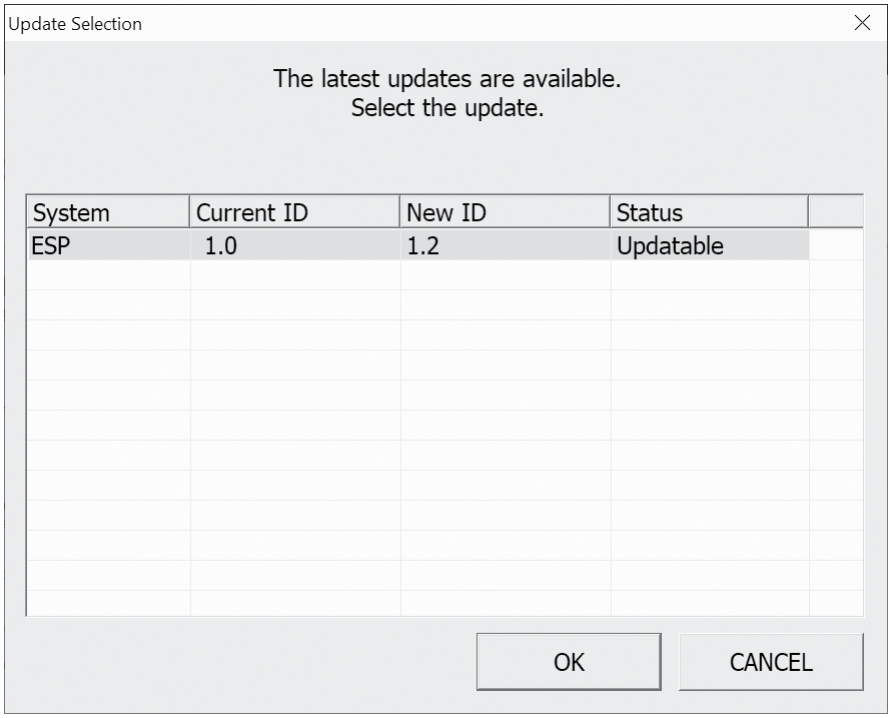
Auto-Tech strongly recommends a minimum subscription of 1 day!

KIA J2534 PROGRAMMING continued...

Programming failure

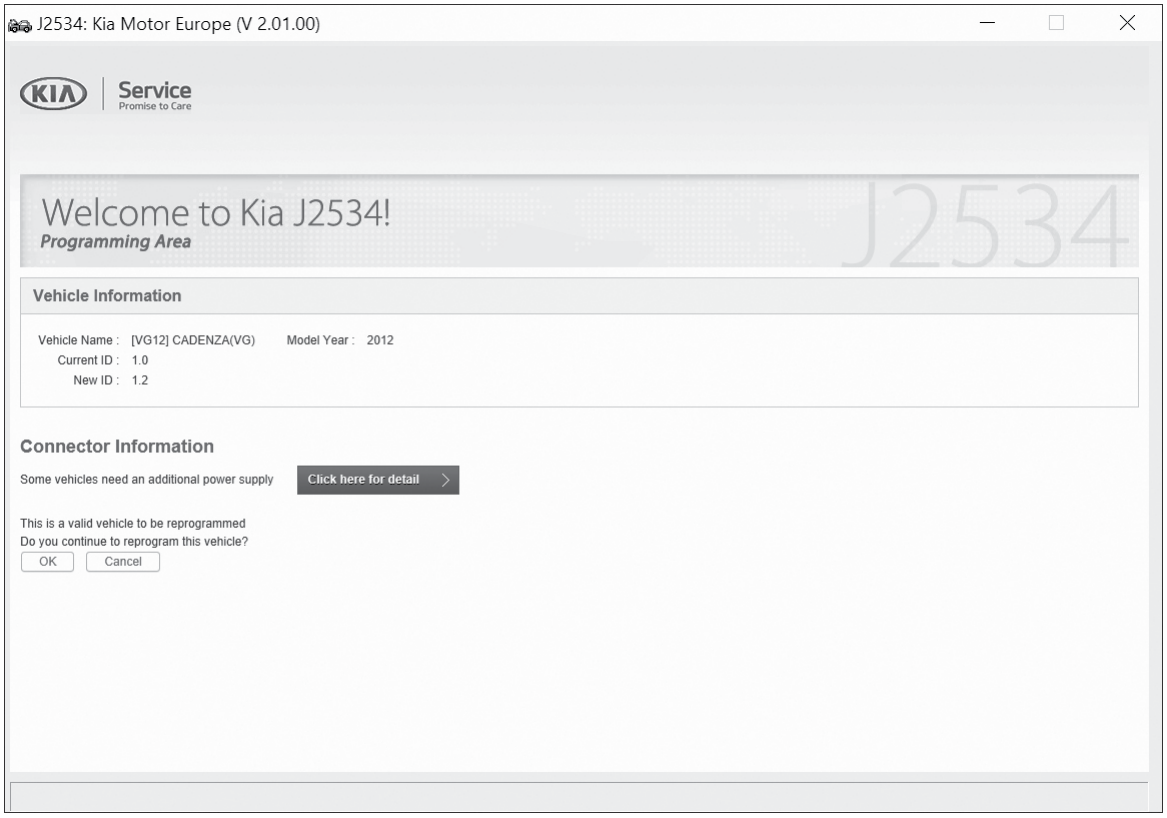
During testing we have identified an issue that occurs with a number of Kia vehicles. The procedure appears to work normally until the final step when a '**j2534 Failure**' message is displayed. It has been deduced that this is not a programming failure of the vehicle, instead it is caused by a glitch in the KME J2534 Application that occurs when the tested vehicle is not supported by Kia Australia. This is most likely an issue that has arisen since the Kia Australia system is directly linked to the Kia Motor Europe system.

If the KME J2534 Application may flag the following update



KIA J2534 PROGRAMMING continued...

If you click OK it will progress to the next stage



Note: *It doesn't matter what model of vehicle is connected, if the application doesn't recognise the VIN it will flag it as a 2012 Cadenza (VG)!*

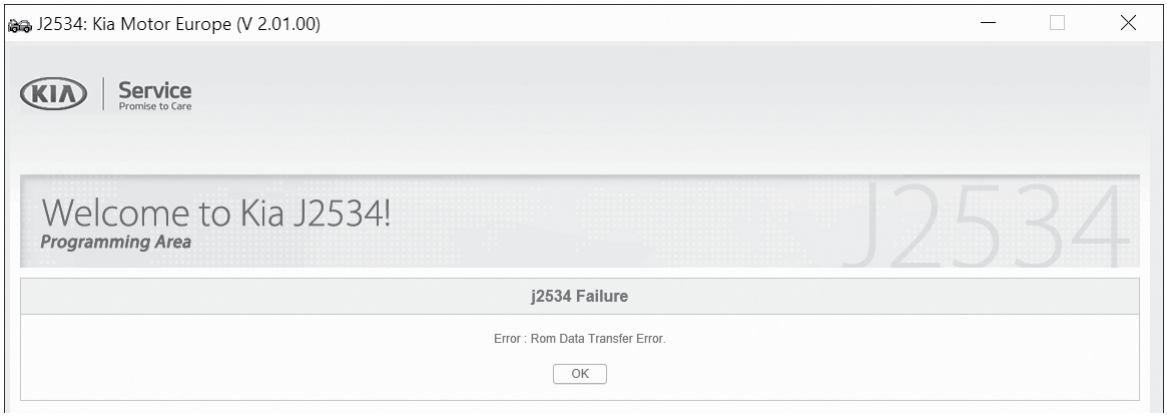
The Cadenza is not available in Australia.

If you click the OK button, the **Downloading ROM file** page will display for a split second and then the **Reprogramming is progressing** page will present for a short time.

Caution: *You should NEVER continue programming when the Vehicle Information does not match the vehicle you are programming!*

KIA J2534 PROGRAMMING continued...

Eventually the following message is displayed



SPECIAL SERVICE TOOLS (SSTs)

Brand	Part #	Applications	Image
Endeavour	ETCP3-AU	Universal J2534 Pass-thru Device	
Mount	CARDAQP3	Universal J2534 Pass-thru Device	
Endeavour	ET9420	Voltage Stabiliser/Maintainer	
Mount-Autoland	PS-M1	Voltage Stabiliser/Maintainer	
Endeavour-Foxwell	GT90	Scan Tool	
GIT	G-scan 3	Scan Tool	

NOTES